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EDITORIAL

THE EMPIRE CONFERENCE ON THE CARE AND AFTER-CARE OF THE TUBERCULOUS

THIS number of the JOURNAL is devoted entirely to the Empire Conference on the Care and After-Care of the Tuberculous, which was held in London last May at Overseas House. Here will be found the papers of all the official speakers on the programme, and in order to publish them it has been necessary roughly to double the size of this issue of the JOURNAL.

An interesting discussion followed each session, and several papers by those who were unable to attend the Conference were read. We hope to publish some of these papers in future numbers in order that the record may be as complete as possible.

In the history of tuberculosis such a conference has never before been held, and those who were able to attend and those who have read the papers here published must have found much that is new, and can hardly fail to appreciate the importance and magnitude of the tuberculosis problem as it affects not only this country but the British Empire and indeed the whole world. So great is the problem that its very elements cannot be grasped by anyone who confines his activities to his own little sphere. There are countries or even districts where tuberculosis has been a big problem but is now under control; there are others where it is still rampant; and, again, others which are free from tuberculosis as a serious menace, but where from experience one can expect its ravages to begin. Tuberculosis as we see it in this country is a problem different in many respects from the tuberculosis in certain overseas districts, and in their turn those abroad see manifestations which are unknown to us.

M.K.

The opinion that tuberculosis must be considered from the broadest possible angle has been growing apace, and a resolution was passed that there should be formed an organisation to consider the problem—an Empire gathering at which experiences and ideas could be pooled, and not one at which any one unit would take the lead. The whole object of the recent Conference was to obtain the views of all the delegates and to try to correlate the various difficulties of one community with those of another. There should be no central council or committee to dictate: such an idea is fundamentally and utterly opposed to the idea of exchange of views. What was proposed and carried unaminously by the delegates at the Conference was the idea of a representative organisation to consider and discuss the problems of tuberculosis as it affects the various units of the British Empire. This Conference was an unparalleled success, and there is little doubt but that we in England have learned from it more than we have taught.

THE BRITISH JOURNAL OF TUBERCULOSIS stands for the clinical rather than the theoretical side of the subject. We have encouraged and published many papers from our friends overseas, and our pages will always be open to them. The importance of tuberculosis as a world-problem has always been before us, and because our policy is to take a broad view of the subject, understanding that much can be gained by a comparative study of the disease, not only as it affects the different races of mankind but also as it affects the animal kingdom, we invited Mr. Hamerton to write on tuberculosis in animals. Our readers will remember the interesting article which he kindly wrote and which appeared on p. 145 of the JOURNAL in 1935.

Let us pool our experiences and so learn not only to treat tuberculosis but to anticipate its occurrence in certain communities, to be forearmed, and to understand as far as possible its vagaries.

EMPIRE CONFERENCE ON THE CARE AND AFTER-CARE OF THE TUBERCULOUS

HELD UNDER THE AUSPICES OF THE
OVERSEAS LEAGUE AND PAPWORTH VILLAGE SETTLEMENT

PROGRAMME

Monday, May 3, 1937.

FIRST SESSION: MORNING

CHAIRMAN:

The Most Hon. the Marquess of Willingdon, G.C.S.I., G.C.M.G., G.C.I.E.

SPEAKERS:

The Rt. Hon. Sir Kingsley Wood, M.P. (Minister of Health);

Sir Arthur MacNalty, K.C.B., M.D., F.R.C.P. (Chief Medical Officer to the Ministry of Health): "The Modern Outlook on Tuberculosis."

Major-General Sir Cuthbert Sprawson, C.I.E., I.M.S., M.D., F.R.C.P. (Director-General, Indian Medical Service); "Peculiarities of the Tuberculosis Problem in India."

R. E. Wodehouse, Esq., M.D. (Deputy-Minister, Department of Pensions and National Health, Ottawa): "Tuberculosis in Canada."

A. D. Pringle, Esq., M.D. (representing the Transvaal Chamber of Mines): "Tuberculosis in Native Employees of the Gold-Mining Industry (Rand)."

S. Lyle Cummins, Esq., C.B., C.M.G., M.D. (Professor of Tuberculosis, Welsh National School of Medicine): "Tuberculosis and the Empire."

SECOND SESSION: AFTERNOON

CHAIRMAN:

The Rt. Hon. the Viscount Dawson of Penn, G.C.V.O., K.C.B., M.D., F.R.C.P.

SPEAKERS:

A. D. Pringle, Esq., M.D. (representing the Transvaal Chamber of Mines): "The Care and After-Care of the Tuberculous among the European Mining Population of the Rand and also among the European Non-Mining Population of the Transvaal and Natal."

S. Vere Pearson, Esq., M.D., M.R.C.P. (Chairman, Joint Tuberculosis Council): "Tuberculosis and City Environment."

Frederick Heaf, Esq., M.D. (Principal Assistant Medical Officer, London County Council); "Tuberculosis and City Environment."

Sir Pendrill Varrier-Jones, F.R.C.P. (Founder and Medical Director, Papworth Village Settlement): "Environmental Factors in Care and After-Care."

Tuesday, May 4, 1937.

THIRD SESSION: MORNING

CHAIRMAN:

The Rt. Hon. Lord Horder of Ashford, K.C.V.O., M.D., F.R.C.P.

SPEAKERS:

D. A. Powell, Esq., M.D. (Principal Medical Officer, Welsh National Memorial Association), "The Fight against Tuberculosis in Wales."

R. J. Collins, Esq., M.D., F.R.C.P. (Can.) (representing the Canadian Tuberculosis Association); "Tuberculosis Activities in Canada."

Sir Henry Gauvain, M.D., M.Chir., F.R.C.S., Medical Superintendent, Lord Mayor Treloar Cripples Hospital, Alton; "Some Problems of Surgical Tuberculosis."

A. J. Collins, Esq., D.S.O., M.C., M.B., Ch.M. (representing the Commonwealth of Australia); "After-Care of the Tuberculous in Australia."

L. S. T. Burrell, Esq., M.D., F.R.C.P. (Physician to the Brompton Hospital and King Edward VII Sanatorium, Midhurst), "The Function of the Hospital in the Tuberculosis Problem."

FOURTH SESSION: AFTERNOON

CHAIRMAN:

The Rt. Hon. Lord Allen of Hurtwood.

SPEAKERS:

Ernest Watt, Esq., M.D., F.R.C.P.(Ed.), D.P.H. (representing the Department of Health for Scotland); "The Fight against Tuberculosis in Scotland."

Ishbel, Marchioness of Aberdeen and Temair, G.B.E. (Women's National Health Association, Ireland); "Peamount, The Irish Papworth."

Miss Gloria Langmaid (representing the Occupational Therapy Association of Canada); "The Place of Occupational Therapy in the Treatment of Tuberculosis."

J. B. McDougall, Esq., M.D., F.R.C.P.(Ed.), (Medical Director, British Legion Village, Preston Hall); "The Re-Settlement of the Tuberculous Ex-Soldier."

Douglas M. Deane, Esq. (representing the Tubercular Soldiers' Aid Society, Adelaide, South Australia); "The Tubercular Soldiers' Aid Society."

G. Lissant Cox, Esq., M.D. (Central Tuberculosis Officer, Lancashire); "Tuberculosis Control."

FIFTH SESSION: MORNING

Wednesday, May 5, 1937.

CHAIRMAN:

The Rt. Hon. the Viscount Goschen, G.C.S.I., G.C.I.E. (Chairman of the Overseas League).

SUBJECT:

"The Native Races and Tuberculosis throughout the Empire."

SPEAKERS:

The Hon. Francis Gaha (Tasmania); "Tuberculosis in Tasmania."

Charles Wilcocks, Esq., M.D., Ch.B. (representing the Medical Services of Tanganyika Territory); "Tuberculosis of the Natives of Tanganyika Territory."

P. V. Benjamin, Esq., M.B., B.S., T.D.D. (Assistant Medical Superintendent, Union Mission Sanatorium, South India); "The Indian People and Tuberculosis."

N. M. Maclennan, Esq., M.D. (representing the Department of Health, Palestine); "Tuberculosis in Palestine."

SIXTH SESSION: AFTERNOON

CHAIRMAN:

Professor S. Lyle Cummins, C.B., C.M.G., M.D.

SUBJECT:

"The Native Races and Tuberculosis throughout the Empire."

SPEAKERS:

Bernard Myers, Esq., C.M.G., M.D., F.R.C.P. (representing the Government of New Zealand); "Tuberculosis in New Zealand."

J. Cauchi, Esq., M.D. (Colonial Medical Service, Nigeria); "Tuberculosis in Nigeria.

G. M. C. Powell, Esq., M.D. (representing the Medical Services, Northern Rhodesia); "Tuberculosis in Northern Rhodesia."

EMPIRE CONFERENCE ON THE CARE AND AFTER-CARE OF THE TUBERCULOUS

FIRST SESSION

CHAIRMAN: THE MOST HON. THE MARQUESS OF WILLINGDON, G.C.S.I., G.C.M.G., G.C.I.E.

INTRODUCTORY SPEECH

BY THE RT. HON. SIR KINGSLEY WOOD, M.P.
Minister of Health

UNTIL some ten or eleven years ago tuberculosis stood first amongst the principal epidemic or general diseases as a cause of mortality in England and Wales. If we go back a little further we find that in 1851 to 1855 it produced a standardised death-rate of 3,638 per million of the population. Since then statistics show a continuing decline in its ravages, and the discovery of the tubercle bacillus by Robert Koch in 1882 led to the development of large-scale measures for its treatment and control, based on a better understanding of the disease than was possessed by the doctors of the mid-Victorian and earlier periods. I am glad to say that in 1935, in comparison with those very high figures which I have just mentioned, the corresponding standardised death-rate was 687. I do not think, however, that any of us who are here this morning would desire to regard this question with undue complacency, and certainly these facts, so far as we here at home are concerned, should not encourage us to take up an easy-going attitude towards tuberculosis, or obscure the fact that tuberculosis still stands in this country next to cancer upon the list of killing diseases. I need hardly say that we are anxious to study every method which we can add to our knowledge of the disease and improve

our anti-tuberculosis measures and machinery and at the same time to contribute what we can to the advancement of the same cause throughout the Empire. I think a tribute is due to those whose energy and enthusiasm have resulted in the organisation of the present conference, which will enable anti-tuberculosis workers, both medical and lay, from all parts of the Empire, to interchange their scientific and administrative knowledge and experience, and to derive, we hope, fresh inspiration for their endeavours in the presentation of a common front to this great enemy of human health and happiness.

The national effort made in this country during the last three decades for the reduction of tuberculosis was the outcome of a preceding period of advance in medical knowledge of tuberculosis, and of an awakening of the public to a consciousness of its dangers and of the necessity for active measures to combat them. As you know, tuberculosis was long regarded as non-infective, but with the discovery of the tubercle bacillus and the establishment of tuberculosis as an infectious disease, the preventive measures with which we are familiar today, such as the discouragement of spitting, the safeguarding of the milk-supply, and diagnosis by the detection of the tubercle bacilli in the sputum, became possible. At the same time there came the pioneer development of tuberculosis dispensaries and sanatoria following modern methods of treatment. It was in 1887 that Sir Robert Philip, the present Chairman of the National Association for the Prevention of Tuberculosis, founded the first tuberculosis dispensary in Great Britain, the Royal Victoria Dispensary, Edinburgh, and the year 1898 witnessed the origin of the National Association for the Prevention of Tuberculosis as a result of a meeting at Marlborough House, held on the invitation of King Edward VII., then Prince of Wales, who in this and in many other ways lent an invaluable aid to the commencement of the campaign in this country against tuberculosis.

It is interesting to see our progress. By 1911, in England and Wales, 14 sanitary authorities had provided tuberculosis dispensaries, and in 50 other districts voluntary dispensaries were available, and by about the same date some 1,400 beds had been provided by local authorities apart from the Poor Law, while there were 84 sanatoria in the hands of private persons or voluntary associations, with a total of about 4,200 beds, of which 400 were rented by the local authorities. That was in 1911, and it was at that time, when to the knowledge of tuberculosis as an infectious disease had been added the development of methods of treatment capable of restoring sufferers to health if applied in good time, that the State, in response to the ever-growing public consciousness of health needs, entered the field with large-scale measures specifically directed against tuberculosis.

The measures that were taken were partly preventive and partly directed to treatment and care of tuberculous patients, though provision for the latter purpose has also of course a highly important preventive aspect. On the preventive side, provision was made in 1911 for the compulsory notification, of all cases of pulmonary tuberculosis, and this was followed in 1912 by the compulsory notification of all forms of tuberculosis. Notification, which is made by the medical practitioner discovering the disease to the medical officer of health of the local sanitary authority, enables ordinary preventive action to be taken, and the medical officer of health is made responsible for the action needed to trace the source of infection and to remove conditions favourable thereto.

The system of notification also affords a means by which the patient and any contacts discovered can be brought in touch with the public facilities provided in the locality for diagnosis and treatment. At the same time it was not overlooked that tuberculosis differed from the acute infectious diseases in which the complaint runs its course in a few weeks. Tuberculosis, as we know, commonly affects the patient's whole after-life, and the regulations were so framed as to insist on the confidential nature of the notification and the avoidance of any action calculated to affect a patient's livelihood unless taken with his consent. In this provision we see the sound doctrine that tuberculosis should not be driven underground by the exposure of consumptive persons to drastic restrictions or interference arbitrarily imposed, but that we should look to education of the population in the elements of health-matters to secure realisation of the all-important need, where tuberculosis is suspected, of recourse to medical advice and the public facilities available for special diagnosis and treatment at the earliest possible stage.

Just about that same time, so far as events in this country are concerned, in the year 1911, there came the first National Health Insurance Act, in which treatment for tuberculosis was made one of the benefits of insured persons ("Sanatorium Benefit") and that was almost immediately linked with, and later superseded by, the main national scheme for providing comprehensive facilities for the diagnosis and treatment of tuberculosis.

Capital grants were made available from the national Exchequer for assisting the local authorities and any voluntary bodies providing institutions in association with them in their task, together with a maintenance grant from the Exchequer of 50 per cent. of the local authorities' net annual expenditure. Later, Sanatorium Benefit was abolished, and the specific statutory duty was imposed on the county and county borough councils to provide an adequate service and sufficient sanatorium and hospital accommodation for the population generally.

Now I think we can point in this country with a measure of satisfaction to the position today so far as these facilities are concerned, and the material growth of the scheme in England and Wales can be judged from the fact that, as against the 5,200 beds which were available in 1911, there were at the end of 1935 some 29,000 beds in approved institutions, of which approximately two-thirds were in institutions belonging to local authorities, who also contribute largely to the maintenance of the voluntary institutions; and I do not think I am exaggerating the position today when I say that the country is covered by a network of tuberculosis dispensaries, with the attendant staff of tuberculosis officers and tuberculosis visitors working in touch with the general practitioners and with the medical officers of health of the local sanitary authorities. Since 1912, over £1,700,000 has been expended in capital grants from the national Exchequer, and some £17,500,000 was so expended by way of maintenance grant between 1912 and March 31st, 1930, when the grant was merged in what we call the block grant—that is, the general Exchequer grant established by the Local Government Act of 1929. So far as the capital expenditure of the local authorities is concerned, I find that the provision of institutions has involved the local authorities in this country in the raising of loans to a sum of over £5,000,000.

Now the main elements of this great and costly special provision, founded upon the report of the Departmental Committee presided over by Lord Astor, are, firstly, the tuberculosis dispensary, and, secondly, the residential institution, and I think it may be said that we have also endeavoured to look at another aspect of this problem. The occurrence of tuberculosis in a family in most cases sooner or later affects the family resources; it removes or reduces earnings; a house previously adequate for a healthy family becomes inadequate and the deficiencies of a bad house are enhanced in their effect. Then, again, it has to be recognised that in a considerable proportion of patients who have been successfully treated there is a tendency to relapse, especially during the first few years following the discharge of the patient if he is compelled to return to the normal stress of life, and during these years it is indeed important that the patient should live and work under suitable and sheltered conditions if the risk of relapse is to be minimised. As you know, the need for making suitable provision to deal with this problem led to the inception of the Papworth Village Settlement. This Settlement makes provision not only for the treatment of patients in every stage of the disease but for suitable occupation during treatment, and upon the completion of treatment for employment under conditions adapted to the needs of individual patients and under continuous medical supervision. I hope many of you will have an opportunity of seeing this

Settlement, because we are very proud of it so far as this country is concerned.

Care work formed an essential feature of the original voluntary dispensaries established by Sir Robert Philip and others, and the need for care work was recognised in the earliest days of the scheme. Certainly the care organisation can give a helping hand to the family in many directions, so as, for instance, to permit of the patient proceeding to the sanatorium with a relatively easy mind, or prevent him from being called home prematurely to deal with the difficulties for which a guiding hand is needed. It can assist in the boarding out of children of infective patients, or in the loan of beds or bedding to enable the patient to sleep alone. Again, it can help in finding suitable employment for the recovered consumptive, or even in providing it, as in some cases we know, by the establishment of small workshops, as has been done in certain localities. There are also certain directions in which local authorities directly assist in the problem of the tuberculous by taking special measures for the rehousing of tuberculous families, as, for instance, is done in Sheffield and other towns, where such a person can be moved to a municipal house which he could not afford to rent without assistance, and receives that assistance subject to the observance of conditions designed to promote the maintenance of his health and that of his family.

I shall look forward with profound interest to learning how these and allied aspects of anti-tuberculosis work—that is, the problem of the tuberculous patient in his home and family as well as in the purely medical outlook—have presented themselves to the different countries of the Empire, and of the experience in dealing with them which has been obtained overseas. Tuberculosis was known in ancient Egypt. In a later age, in this country, John Bunyan named it with grim truth " the captain of the men of death." Far as we have gone towards its conquest, it is still with us, and while that is so we none of us can rest content. And whatever the differences in attack and incidence dictated by local conditions, the winning of fresh ground against this fell disease is a worthy task, in which we must all be allies and helpers.

I wish this conference, my lord, the greatest possible success.

THE MODERN OUTLOOK ON TUBERCULOSIS

By Sir ARTHUR MacNALTY,
K.C.B., M.D., F.R.C.P.,
Chief Medical Officer of the Ministry of Health.

The medical practitioner now treats tuberculosis with greater hope and with more success. He has found in artificial pneumothorax a valuable aid to the treatment of cases in the early and moderately advanced stages of pulmonary tuberculosis. Dr. F. J. Bentley has recently reviewed the experience of the London County Council, and has endeavoured to assess the value of the treatment by comparing the fate in 677 cases with that of 3,329 treated by conservative methods only. He shows that there is a gain of 129·53 lives at the end of three years; that is, an increase of 19·1 per cent. in the number alive over the expected number amongst those conservatively treated. A smaller group followed for five years shows a gain of 18 per cent. at the end of three years and of 19·8 per cent. at the end of five years. More work is also done today in thoracic surgery; lives are prolonged by thoracoplasty and other forms of collapse therapy. Here a judicious selection of cases is all-important.

As R. R. Trail has shown in his Mitchell Lecture (1936), blood examinations and tests are of increasing aid in estimating prognosis, whilst of late years the advances made in radiography assist diagnosis. It must be remembered, however, that pulmonary tuberculosis still reveals itself by physical signs and symptoms, and that palpation, percussion, and auscultation are not displaced but are reinforced by a skiagram of the chest. Keep the tried and proven methods; add the new method to the clinical armamentarium. The wise physician will not be blown about by contending winds of doctrine.

In addition to the advances made in the medical treatment of pulmonary tuberculosis the work of Gauvain at Alton and of Rollier at Leysin has demonstrated the value of conservative methods in the treatment of surgical tuberculosis; artificial light treatment has raised the cures in *lupus vulgaris* (tuberculosis of the skin) to 90 per cent., and has, therefore, completely changed the unfavourable outlook in regard to this disease. More is being learned about the early diagnosis and treatment of renal tuberculosis, as H. Lett has shown in his Bradshaw Lecture (1936), and even in intestinal tuberculosis advances in therapy are reported.

A striking feature of the modern outlook on tuberculosis is the public

recognition of the social and economic effects which follow in its train. For these reasons Mr. Lloyd George made sanatorium treatment a prominent feature in the National Health Insurance Act of 1911, a measure which led on to the National Tuberculosis Schemes of Local Authorities with their machinery of prevention and treatment available for the whole community. The triumphs of preventive work in tuberculosis are too well known to be dwelt on here. An improved standard of living and hygiene, better wages, better nutrition and public health measures, together with the segregation of infectious cases of pulmonary tuberculosis in poor-law hospitals, and the cessation of indiscriminate expectoration exerted their influence on the decline of tuberculosis in England and Wales before special attention was devoted to the problem by the State. Building on this good foundation a wealth of medical and scientific knowledge has been assembled to prevent, diagnose, and treat tuberculosis. The public have co-operated splendidly in taking advantage of the facilities provided. Voluntary and lay workers have toiled side by side with the professional workers, doctors, health visitors, and nurses, and they have seen their reward in the steadily declining death-rate from tuberculosis year by year. In this awakening of the public conscience to tuberculosis the valuable educational work of the National Association for the Prevention of Tuberculosis and of the Welsh National Memorial Association calls for mention.

It was said of a French marshal that he knew how to win victories but not how to make use of them. A man with arrested pulmonary tuberculosis is a damaged life. Put such a man into competition with healthy labour in the open market. More often than not he breaks down under the strain, his old disease flares up and his last state is worse than the first. It is this sociological factor that has vitiated so frequently the successful results of sanatorium-hospital treatment. Sir Pendrill Varrier-Jones, in his great work at Papworth, has coped with this aspect of the tuberculosis problem in the establishment of the village settlement, and his methods have been followed with success at Preston Hall and elsewhere. In essence, the village settlement consists of a hospital-sanatorium (treating patients in nearly all stages of tuberculosis) with the addition of an industrial section, where the treatment may be prolonged and training in a suitable occupation begun. The village settlement provides permanent employment under hygienic conditions in a variety of trades, paying Trade Union rates of wages to its trained workers and thus constituting a village community which combines industrial work with a rural environment. It cannot " cure " every case of tuberculosis, but in the majority of cases it will prolong the life of the patient by promoting longer quiescence of the disease. This is the best solution, but many patients are unfitted tempera-

mentally, or in other ways, to become inmates of a village settlement. For these men and women a care and after-care organisation is essential, and should be closely associated with the local tuberculosis scheme. The Minister of Health has touched on the various ways in which this assistance can be rendered. They will form the subjects of deliberation at this Empire Conference. I may, however, observe that this side of anti-tuberculosis work, too long neglected, is receiving today much more attention from local authorities, is providing most helpful assistance in many areas, and is assuming greater importance.

My friend and teacher, Sir Victor Horsley, said in 1913: "We live in an Empire where the sun never sets, and in slums where the sun never rises." These slums have been the breeding-places of tuberculosis. With the public-health work of a quarter of a century behind us and the new weapons and new knowledge of combating tuberculosis we have done much to take away that reproach. I am sure that a great conference such as this, where representatives from the whole of our far-flung Empire bring their knowledge and varied experience to the consideration of measures for combating tuberculosis, will mark a further step forward in the conquest of this disease.

PECULIARITIES OF THE TUBERCULOSIS PROBLEM IN INDIA

By Major-General Sir CUTHBERT ALLAN SPRAWSON,
C.I.E., I.M.S., M.D., F.R.C.P.(LOND).
Director-General, Indian Medical Service

At the present stage of our campaign against tuberculosis in the various overseas countries we should, I believe, direct our attention principally to the differences that these countries show to one another and to the Mother Country, and in consequence to the modifications from a general plan of campaign that are necessary in each individual country. In Great Britain and in other parts where public health procedures have been well established for some time and where the intelligent co-operation of the general population is readily obtained, the best lines of action for a campaign against tuberculosis are now generally accepted; but this is not always the case in less advanced countries, and is certainly not the case in India. Perhaps because of this we see sometimes public health workers from India, after an intensive study of anti-tuberculosis measures elsewhere, return to their own country and advocate strongly the direct

introduction in India of those measures they have seen successfully applied abroad. I maintain that there are so many special features of tuberculosis, certainly in India and probably in other countries, that the summation of their effects may require us to modify greatly the strategy of our local campaigns. I will now attempt to define the chief features of tuberculosis difference in India, and will note more especially those differences that may modify our action in the campaign.

1. A striking difference is noticeable in the human soil in which the bacilli work in India as compared with Great Britain. It has been noted by several previous observers that the Indian population as a whole is more susceptible to tuberculosis than the population of England or Scotland, and that the disease in India often tends to run an acuter course, and to resemble the disease in children elsewhere—in other words, that the immunity in India is less. This observation is generally applicable to India as a whole, but there are exceptions to its applicability in particular cases. Tuberculosis has been known in India from the earliest times, and descriptions of the disease can be recognised in acccounts of early Hindu physicians. One would expect, therefore, that settled urban families would have developed some immunity; but the population of a large city is often floating, and is reinforced by villagers who may migrate permanently to a city or, as is often now the case, may live in the city for industrial purposes for several years and return to their village on retirement from work. Such villagers have often returned to their homes with active tuberculosis; but until recently the disease has usually been confined to the actual returned workers or their immediate families and has not spread among the rural population. Lately, however, there are signs that it is doing so, and tuberculosis is established endemically in several villages, particularly in the Punjab and North-West Frontier Province. In addition to the ordinary rural population, who enter freely into Indian cities for purposes of work and trade, there are various more primitive folk who live either on the outskirts of India or in its more remote areas and who are often recruited into Government military or civil services. These folk are much more susceptible to tuberculosis than the ordinary Indian rural population, and their reaction to infection is such as we associate with a primitive people. The most striking example of such people in India are the Gurkhas, who show in comparison with other soldiers of the Indian Army a greatly increased susceptibility to and mortality from tuberculosis. Similarly, it has been observed that the Pathans are also more susceptible than the ordinary Indian rural folk.

A consideration of the distribution of the Indian population into city-dwellers, rural people, and primitive folk, together with the increasing

facility of communications, especially by country motor-buses, throughout the country, will show that we have all grades of immunity to deal with and many opportunities for infection of the partially immune, and such consideration teaches us that we should conduct our propaganda against tuberculosis not only in the cities, as hitherto, but also in the rural areas, at any rate of Northern India, where the rural diffusion of the disease appears to be greater.

It is appropriate to remark here that most of the observations and deductions about tuberculosis in India are those of individual workers, and cannot usually be supported by statistical evidence as in most other countries. Apart from figures relating to the Army and to prison populations, statistics of tuberculosis morbidity and mortality in India are most untrustworthy. It is necessary to remark this now so as to make it clear that equal weight should not be placed on observations connected with the prevalence of tuberculosis in India as if they were supported by good statistical evidence.

2. Difficulties peculiar to India and to a few other Oriental countries are those due to the purdah system and to the marriage of girls at too early an age. Indian public opinion is now slowly becoming alive to these dangers, and things are beginning to improve; but the evil effects of the former are still seen in the frequency with which tuberculosis will attack successively the several members, women and children, who are living in one zenana, and the evils of too early marriage are seen in the undue prevalence of acute tuberculosis following childbirth or lactation. These are evils of the middle and upper classes, and one can only rely upon an improved knowledge of hygiene for their eradication.

3. Another peculiarity of tuberculosis in India is the large proportion of cases where the disease is confined to or principally in the abdomen, apart from cases of secondary abdominal involvement or generalised tuberculosis. Here again I cannot give trustworthy statistical figures. The abdominal infection is so marked a feature, especially in children and adolescents, as to suggest that the source of infection has been by ingestion and not by inhalation.

4. In one respect India can claim an advantage over the countries of Northern Europe in that it can apparently neglect the bovine bacillus as a source of infection. The Indian cow appears to possess a relative immunity to tuberculosis, and though bovine tuberculosis is not so uncommon, at any rate in Northern India, as at one time was thought, the bovine disease is believed to be so rare as to require no special public health measure so far as the protection of man is concerned. Even the cases of surgical tuberculosis, of frequent occurrence in certain parts, appear in India to be due to the human bacillus. Apart from this the almost uni-

versal Indian practice of boiling milk before consumption would obviate the necessity of other measures.

5. When we come to consider the measures we should adopt in our campaign we find one remarkable distinction between conditions in India and Europe. In most countries the tuberculosis dispensary is rightly regarded as the local headquarters of the campaign; it is the place where cases are diagnosed and then sorted out for appropriate treatment, institutional or home, and is the centre of epidemiological observation. When the tuberculosis dispensary was introduced to Great Britain there already existed a considerable amount of hospital accommodation suitable for tuberculosis cases, either in special chest hospitals or elsewhere. It only remained, therefore, to create a *liaison* between the dispensary and the hospital and the sanatorium, and the directions of the dispensary officer could be followed. But in India special hospitals for tuberculosis cases do not exist except in very few of the largest cities, and even in those such accommodation is most inadequate. Most provinces of India now each have one small sanatorium, serving principally middle-class patients and too small to exert any influence on prevention. General hospitals exist in any town of size, but without special, or at least without adequate, attention for the tuberculous patient, and these hospitals are unable to accept more than a few of these cases at a time. When, therefore, a dispensary officer tries to dispose of his patients on orthodox lines he finds himself in the position of a field ambulance that has no clearing station or base hospital for the disposal of its cases. He cannot send patients to a sanatorium: there is no room and the patients usually could not afford it if there were. He cannot send them to a hospital for lack of sufficient accommodation there as well as frequent lack of expert attendance. He can only keep his patients as out-patients—a rôle for which the majority of Indian cases of tuberculosis are by no means suited. Even if he adopts treatment by artificial pneumothorax the medical officer in most towns would find himself without the aid given by radiology. It is true that the principal function of the dispensary is supposed to be preventive and for epidemiological research; but India as a whole is not sufficiently advanced to adopt those as the principal functions. The *League of Nations Health Bulletin* (December, 1932) states: "In a community well-equipped for the campaign against tuberculosis, it is preferable that the dispensary should not give treatment." That is true enough, and India's difficulty lies in the fact that she is not yet well-equipped for the campaign against tuberculosis. Treatment must continue to be a feature of the tuberculosis dispensary in India, whilst prevention and epidemiology are given increasing importance and diagnosis and distribution of cases should at

present be the main endeavour. The dispensary system of tuberculosis control presupposes existing hospital or sanatorium accommodation for all the cases the dispensary may send there, and in India that does not exist. I think this fact is sometimes insufficiently appreciated by some who study tuberculosis campaigns in England or elsewhere and then try to apply their learning too directly to Indian conditions. We must get hospital accommodation first, or at any rate get much more than we have now. By so doing we should achieve the double object of supplying the most essential link in the chain of case disposal and simultaneously be carrying out a valuable measure of public health by removing from the streets and from their homes many who are a fertile source of disseminating infection.

6. Another type of institution whose applicability to India must be considered is the tuberculosis colony or settlement. The tuberculosis colony was first introduced as a place of residence and work for those who had recovered after sanatorium treatment but were not sufficiently robust to resume work in their former surroundings. A small colony of this nature has already been introduced as an appendix to the largest sanatorium in India, at Madanapalle; but its scope is obviously limited, and in India its utility would appeal only to the most intelligent of the middle classes. The majority of Indian patients are anxious to go back to their home-surroundings as soon as possible after the return of health; further, they will not as a rule go very far from their homes for treatment. But the tuberculosis settlement has developed in various places, as at Papworth, into an institution receiving cases of all types, with its own dispensary, hospital, sanatorium, and factory, and for such an institution in India I believe there is room. No such settlement has yet been established there, but if every large Indian city, with a population of 100,000 or more, were to start a tuberculosis settlement a few miles outside municipal limits, with accommodation and arrangement for expert treatment of patients of all types, and with separate quarters for the families of those fit to resume work, I believe that we should not only fulfil a need but establish a degree of improved public health.

It must be admitted that the mentality of the Indian people does not appear at present to be of the kind that would bring patients and families of their own free will to live in a settlement apart from their previous society; but I believe when the way has been shown by the personal example of the more intelligent, that in time the people would be able to adapt themselves to their new life. Further, I believe that economic conditions would compel several families to leave their homes and remain in such a settlement, at any rate for a considerable time. It has to be recognised that a settlement

of this nature, with its hospital, sanatorium, and factory, cannot be self-supporting, and would have to rely on aid from official or private sources.

7. Lastly I come to the means of raising money for the establishment of the institutions that I advocate. In Great Britain popular demand finds expression in popular subscription, and vast sums have been contributed by an intelligent population to the upkeep of voluntary hospitals and of tuberculosis institutions. These subscriptions have come from all classes of the people, and not only from the most wealthy and enlightened; but in India, until very recently, such popular subscription has been unknown. People in India have hitherto, except in a few instances in the two or three largest cities, looked to their Government to provide all that is necessary for charitable treatment; they have made practically no effort to take the initiative themselves in a campaign against any disease, and have contributed but little towards hospital treatment. Such charitable funds as have been raised have been in a few large sums from fewer wealthy donors who have given generously, but often for a special reason, either to perpetuate the memory of a deceased relative or of their own name. I feel that if we are to advance and at the same time secure popular interest in our campaign that this method of raising money must change. Firstly, we must not rely principally on Government assistance—the movement must be popular—and, secondly, the subscription must be widespread and popular and the ground therefor previously prepared by propaganda. I maintain that it is far better to collect one hundred rupees by many small subscriptions than to obtain a gift of a thousand rupees from one or two donors. That it is possible to do this has been shown recently by the energy and interest of a lady in South India. In 1933 Mrs. Todd, in the Salem district only, raised the equivalent of £2,500 in one day in a campaign against leprosy. Of the coins her co-workers collected, 70,000 were of one farthing each only; and 5,000 of the coins were equivalent to only one-twelfth of a penny each. Those who could give no money gave small contributions of rice or coconut, which were afterwards sold. On similar lines this same lady beat her own record in 1935 by raising in another district of South India £11,250 in a Silver Jubilee campaign against tuberculosis and leprosy. The importance of raising money by small subscriptions is that this necessitates a thorough dissemination of propaganda, and further that every donor is not only giving his money, but his personal interest in the campaign, and the latter is just as important as the former.

I commend the method of small but widespread contribution to other parts of India as well as to other countries that may be similarly placed, and I look upon it as one of the essential methods of progress in our campaign.

At the same time, if the popular demand expresses itself by a generous and widespread contribution, then the people have a right to expect that their Government will do its share in providing the necessary official organisation of tuberculosis officers and institutions. The League of Nations have stated that in countries where the campaign against tuberculosis is most efficiently organised, the total expenditure on this head may be estimated at about one rupee per inhabitant per annum. The population of India is now approaching 400 millions: the expenditure on tuberculosis is in no relation to that vast amount.

I have spoken of some of the features wherein a tuberculosis campaign in India should proceed on lines different from those commonly adopted in Great Britain. The most important point I consider to be that advocacy of the tuberculosis dispensary as the nucleus of a campaign should not be made without understanding that simultaneously some form of hospital accommodation must be made for the disposal of the majority of cases: otherwise the campaign must fail both from the clinical and public health points of view. I believe, also, that there is need for other countries to adapt their campaigns more to local conditions and not to transplant a system merely because it has proved successful elsewhere.

TUBERCULOSIS IN CANADA

By R. E. WODEHOUSE,
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In our situation in tuberculosis we are more guided in our practice and in our mental attitude towards the clinical phases of the disease and the problem as a whole by our United States cousins. We are pretty close to them geographically, medically, and mentally, and in a lot of other ways. We modify some of their plans and principles because we are not exactly the same; we still have some rudiments of British practice and thought in our country, but we have not got so far as adapting the Papworth after-care colony practice in Canada. We have thought about it very seriously. We have not found anyone yet with sufficient courage to undertake it. I think that really is the first excuse. We have done a lot of things over there after others have done them successfully, and we have often done them very well, but probably we are a little

bit reticent, conservative, and so long as we are not losing too much ground in the meantime, maybe that is not a very great detriment.

Our death-rate from tuberculosis this year, although the figures are not out yet, will be round 60 per 100,000 for all forms of tuberculosis. Now that is a very creditable figure. It has been going down. It probably was 180 when we started the Canadian Tuberculosis Association in 1900 under the impetus of a letter which came actually from King Edward VII. to the then Governor-General. That includes the deaths among our North American Indians, which is a very high death-rate. In the province of British Columbia, where there is a very considerable proportion of them located, their death-rate runs as high as 700 per 100,000. In Saskatchewan and the Plains the death-rate of the white population is so low that I am afraid you would not believe it if I told you—it is under 25, I think, this year per 100,000, and they have two hospital beds for every death each year from tuberculosis. They have an admission scheme, so that any person in the province, regardless of his financial status, can go into the sanatorium without charge and can receive first-class care, and can receive it as long as the doctor in charge of the institution finds that it is going to benefit the patient.

Now the Minister of Health this morning mentioned the great advantage of the social services which are available in the United Kingdom to assist the family of the individual who may have to go—that is the bread-winner or even the mother, who may be the bread-winner too, of course—while that person has to undertake care. We have, to a very modest extent, a social service which helps us in a similar way. There is there what they call a mother's allowance: where the father dies and the family are probably going to be divided, to go into different homes with relatives or into institutions, or probably daily to a creche, a place for the care of the children while the mother goes to work; the State gives the mother an allowance which makes it possible for her to retain her children in the home and to remain at home with them. Now if the parent becomes tuberculous the State treats the family as if the man were dead. That is quite a great concession. If he will go into a sanatorium and will take the treatment so long as the State wishes him to, and behaves himself in the sanatorium, his family will receive the same support from the Mothers' Allowance Board that the family would receive if the father were deceased, and they would also do that if the mother has to go into the sanatorium, to assist the father to maintain a housekeeper and hold the family together.

In treating our North American Indians in Saskatchewan, I think under Dr. George Burgess, whose work is well known by all British workers in tuberculosis, they halved the death-rate among the aborigines with a

five-year administration, and that is very good news. We are quite convinced that we can handle the incidence of tuberculosis in Canada in their case probably as well as we can among the whites, provided we get the national assistance and social services. A report is being made to the Federal Government to bring this about to a larger degree than only in the one province of Saskatchewan.

TUBERCULOSIS IN NATIVE EMPLOYEES OF THE GOLD-MINING INDUSTRY (RAND)

By A. D. PRINGLE,
M.D.(ABERDEEN)
Medical Superintendent, Springkell Sanatorium, Transvaal.

The native employees of the gold-mining industry comprise, as a working unit, some 330,000 persons, of whom approximately 300,000 are underground workers. This is not a fixed number, there being very nearly 100 per cent. change of personnel within a year, which means that throughout a period of twelve months there are over half a million natives who have been employed for varying periods by the gold mines.

This huge supply of labour is drawn from the Transkei and Ciskei, from Basutoland, Portuguese East Africa and, to a lesser extent, from Natal and Bechuanaland. Recent endeavours have been made to obtain labour from farther north, and this supply of labour will probably increase in the future, as hitherto latitude 22° S. has been the northern limit of the area in which natives may be recruited. A very large number of these seek employment voluntarily on the mines and the balance are recruited. There is not the slightest element of irregular persuasion or undesirable influence regarding these recruited boys. In the country or territory where they are recruited they are first examined by a medical officer, who decides whether they are likely to be suitable for mining employment. They are again examined at a centre nearer to the Rand, where a further elimination may take place. They are transported to Johannesburg free of cost, special trains are arranged for, and one or more European employees travel with the train to see that the natives are properly taken care of. On arrival at the Rand they are submitted to a very thorough medical examination before being passed fit for service. From this Rand central examination station the boys are drafted to the various mines along the reef, where the medical officer attached to the mine again examines these boys respecting general fitness, and particularly with a view to detection of tuberculosis.

The average period of employment for recruited boys varies from nine to twelve months. The greatest danger to these natives is the contraction either of pneumonia or tuberculosis. Pneumonia among these workers is just as fatal as it is to individuals, irrespective of race, in other walks of life, but a very special eye is kept on the possible deterioration of the boys' health in respect of tuberculosis. The natives are periodically weighed, and all those showing an unreasonable loss of weight are immediately placed in hospital for observation. All cases admitted to hospital owing to accident and general disease are specially examined for pulmonary complications. Should a boy be found to have developed tuberculosis he is retained in hospital and, if in the early stages, is repatriated to his home. All native employees are compensated for silicosis and for tuberculosis when they leave the service of the mines.

The natives on the mines are housed in compounds varying in size according to the size of the mine. Some years back the practice was to have a large number of boys in one room, but recently it has been found better to have smaller numbers of boys housed separately with the object of lessening possible infection to others.

The deaths from tuberculosis among natives since the inception of the mining industry up to about twelve years ago was very heavy, but in 1925 the gold-mining industry, concerned over a high tuberculosis attack-rate and death-rate, proposed that a Tuberculosis and Research Investigation Committee be formed, with a view to studying the question in all its aspects. A distinguished member of the medical profession in Great Britain was appointed adviser and consultant to that Committee, and as a result of this Committee's investigations and resolutions there has been a tremendous improvement both in the attack-rate and death-rate from tuberculosis.

I would mention that among the most important changes made are the following:

The appointment of whole-time medical officers for the natives. This was a great improvement on the previous custom of having "part-time" medical officers, where the natives ran a risk of neglect.

Considerable changes and improvements have been made in the diet scale.

Underground workers are provided with warm clothing to protect them against chill.

The natives are periodically examined with the object of giving an indication as to how their health is standing up to the work.

All natives of long service (from five years and over) have to submit to a compulsory stethoscopic and radiological examination with a view to detecting silicosis or tuberculosis.

The native is educated to take a substantial morning meal before proceeding underground. Previously the natives were not anxious to take this early morning meal, but as they dislike taking meals underground it was considered desirable to insist on this early meal.

With a view to building up a nursing staff among the natives themselves, native nurses are now trained in hospital ward-work—this is proving a great success.

Experience taught us that it was in the first period of service that the native was most vulnerable to attack, and to avoid putting them to heavy labour squads of new boys are now placed on special light work to accustom them to the environment and type of work. There is a further graduation: no new boy is sent to work at deep levels until he has a period of service at the higher levels.

The new boys are given demonstrations of how to use mining implements and how to avoid mining risks underground.

In the compounds provision is made for wireless sets, football fields, and other amusements to keep the natives disciplined and contented, and to discourage their wandering away into such undesirable surrounding conditions as do exist on every gold-mining field.

It might well be asked: "Why repatriate a sick native back to his home?" Actually the Government Native Affairs Department insists on these sick natives being repatriated. In any case the native worker is not hospitalised; he would sooner travel home sick than be detained in hospital with the prospect of his health improving.

It might be expected from a large concern like the gold-mining industry that they would take a broad and generous view in respect of their huge responsibility regarding their employees. They have a very special interest in the health of the natives. In 1934 the industry donated £84,000 for the establishment of medical and hospital services in the native territories. In 1936 £11,000 was donated to native missions and hospitals. Every year more than £3,000 is given to medical missions. All this with the special object of guarding the health of the natives in the territories where they are recruited. In 1936 £6,500 was given to the University of the Witwatersrand with the idea that indirectly the natives might benefit from research and medical services carried out by the University.

There has been formed a Mine Medical Officers Association comprising all whole-time mine medical officers in charge of natives, with the addition of doctors specially experienced in tuberculosis and research work. All problems pertaining to the health of native employees are discussed.

After the conclusion of the labours of the Tuberculosis Research Com-

mittee in 1930 (a voluminous report was issued), in order to establish continuity the gold-mining industry formed what is known as a "Health Advisory Committee"; this comprises mine medical officers, tuberculosis officers, and representatives of mine managements.

The question might be asked: "Why should there be so much tuberculosis in South Africa, a land noted for good weather and plenty of sunshine?" It is established that tuberculosis was first introduced among the natives of South Africa by European immigrants. It is possible that the first introduction took place in 1652, but more especially from the year 1820 and onwards—particularly about the year 1880, when a number of European tuberculotics came to this country with a view to regaining their health in what is really a wonderful climate. Now the gold-mining industry did not reach any substantial proportions until about 1894, so that we are aware that there was a considerable amount of tuberculosis among the natives of South Africa before gold mining was established.

The fact is that with the advance of civilisation the needs of the native have increased, and that if they cannot find employment in the gold industry, they seek employment in all the large centres of industry, and we have good reason to believe that the tuberculosis attack-rate would not be very different.

What of the natives who are employed in industries and occupations not connected with the gold-mining industry? It is regrettable to say that regarding these there are practically no statistics, but anyone travelling round South Africa, and noting the miserable hovels in which large numbers of natives live, must be convinced of the fact that the mortality from tuberculosis must be high. One has only to investigate the mortality of natives in towns like Durban, East London, Port Elizabeth, and Cape Town to be convinced of the truth of the above statements.

In the large towns, at any rate, all the other nationalities not Europeans are classed as the non-European population, and this comprises natives, coloured persons, and Asiatics. It can be said that, as an average, the death-rate among the non-European class is about eight times greater than that for Europeans.

There are a certain number of trained native health visitors who can explain in their own language to the natives the danger of the disease, not only to the patient but to contacts, and explain in an elementary way simple hygienic measures. The project has been very successful and it is likely to be considerably expanded. The non-European patient and contacts are encouraged to attend the T.B. Clinic. Some idea of the progress made at Maritzburg may be given when it is stated that the number

of native attendances at the T.B. Clinic increased in eighteen months from ten to sixty-four.

One of the greatest difficulties is the native's fear of going to a hospital—speaking generally, there is not even the beginning of a hospitalisation spirit among the rural Bantu.

TUBERCULOSIS AND THE EMPIRE

By S. LYLE-CUMMINS,

C.B., C.M.G., M.D.

Professor of Tuberculosis, Welsh National School of Medicine.

The problem of tuberculosis throughout the Empire is twofold: the tuberculosis of European communities and the tuberculosis of native populations.

The health of the European communities in our Dominions and Colonies is exceptionally good, but, nevertheless, tuberculosis has to be faced—and we know from the various communications at this Conference how ably and thoroughly the great nations of the Empire have faced it.

But the problem of tuberculosis as it affects the native populations is more complex and more difficult; so difficult in fact that the toll of tuberculosis, like the "toll of the road," tends to be forgotten or else relegated to the limbo of regrettable but inevitable misfortunes.

Why is the problem so complex and so difficult in native populations?

It is complex because for many of the agricultural and pastoral peoples of the Empire it is a relatively new disease to which they are extremely susceptible.

It is difficult because this newly communicated infection finds our native communities in a state of rapid transition, under European influences, from their old traditional cultures, customs, and habits to a new industrial and mechanical mode of life.

In many parts of the Empire, in some of the most precious elements of the Empire, in the unspeakably valuable populations of India and of Africa, tuberculosis is increasing and seems likely to increase still more unless something effective can be done to stop it.

Before considering how tuberculosis may be controlled in the native populations of the Empire, let us ask why it once rose and is now falling in this country?

In England it increased in almost epidemic form during what has been called the Industrial Revolution, when the people of England left the

country places for the slums of the growing towns, and when the arts and crafts of village life were abandoned for the higher wages of city factories.

For the last eighty years or so the incidence and mortality have been falling. Why? Because of the adaptation of our populations to urban and industrial conditions; because of the spread of education; and, above all, because of the improvement in the standards of living.

In point of culture and development our African native populations stand today much as we stood at the time of the arrival of Julius Cæsar on our shores. Of the great Indian nations it may be suggested that they stand today, where England stood at the invention of the "Spinning Jenny"—on the brink, that is to say, of an inevitable and far-reaching industrialisation.

It has been our lot to help India and Africa towards this new kind of culture, these new responsibilities, with their corresponding advantages and their associated dangers.

We have been through it all; we have passed through the abyss in which tuberculosis pullulates—the abyss of slum-dwelling, over-crowding, under-nourishment, ignorance and illiteracy—and we are only now struggling upwards to happier conditions.

We have learnt much. We possess the knowledge by which tuberculosis can be kept in control.

Do we not owe it to our great Dependencies to place at the disposal of our native populations the methods, the systems, the organisations, which have proved efficacious in our own struggle?

Britain may well be proud of the work of her sons in elucidating the problems of tropical medicine. We have passed on to our imperial populations the results of our researches into malaria, sleeping sickness, Malta fever, kala azar, filaria, bilharzia, and many other terrible maladies.

But have we not been rather fatalistic about tuberculosis? Can we claim to have done, for this scourge of native communities, even as much as some other nations? Have not the French Colonial Administrations applied the teachings of Calmette and the American Dependencies the lessons of Trudeau, of Bushnell, of Opie?

We, with our vast Empire, have left it very much to Colonial Administrators to carry on in the light of local opinion.

It is time we woke up to the inestimable value of health to the peoples of our Empire and through them to us. Tuberculosis must be faced by organised science if it is to be overthrown.

How can organised science be brought to bear upon a problem so complex over an area so vast?

It is impossible, in the time available, to do more than generalise, but a few general ideas may help.

To begin with, let us draw a sharp distinction between our African dominions and dependencies and the great Indian Empire. For many years to come, the problem of tuberculosis in our African natives must be shouldered by British officials as a part of local health administration. The African natives have not yet developed a native medical personnel fit to shoulder the burden. But India, with her new Constitution, is in a totally different position. She is the mistress of her own fate and must face her own health problems.

Can it be said that India possesses, as yet, the men and the means for the task?

Until recent years the hygiene of India has devolved upon British officials, and great progress has been made, in which Indian medical men have come gradually to share to an increasing but as yet a relatively slight extent.

The problem of tuberculosis bulks large in the difficult task which is so soon to devolve upon the medical profession of India.

In what position are they to shoulder the burden? It would seem that India, at the present time, possesses, apart from occasional accommodation in general hospitals, about one thousand sanatorium beds specially staffed and equipped for the care of tuberculous cases.

Now sanatorium beds serve a double purpose: they accommodate the sufferers from tuberculosis; they afford to medical men the opportunity for training in the treatment of the disease.

How are the Indian doctors to deal with these consumptives without properly organised residential institutions in which to treat them? How are the able young Indian graduates of the numerous Indian Medical Schools to acquire the special training needed for the care of tuberculosis? A thousand sanatorium beds! A drop in the ocean!

The whole problem of tuberculosis in India—a *growing* problem, for the disease is everywhere on the increase—has yet to be faced.

It is the duty of England to help by guidance, by example, and by education.

If the Indian doctors lack facilities for the study of tuberculosis in their own country, let us help them to study here; let us urge on the Government of India to send large numbers of Indian doctors to study tuberculosis here in the institutions of our most progressive tuberculosis organisations and in those of our universities and medical schools possessing facilities for teaching.

How keen and competent these Indian doctors are I know by personal

experience, as many of them have come to study with me during the last ten or fifteen years—chiefly at their own expense and on their own initiative; but surely the Government of India should subsidise such courses of study on a very large and generous scale !

Seeing that the population of India is faced with an increasing incidence of this disease, which spreads from parents to children in infected homes and can only be checked by the isolation of open cases, is it not our duty, in passing on our health responsibility to her sons, to urge upon India the need for comprehensive tuberculosis schemes throughout her peoples and her nations ?

In this country we talk much of propaganda for health education ; of the advantage of dispensaries for the detection of early cases ; of the need for after-care schemes.

Of what avail is propaganda, in a vast, impoverished and largely illiterate population, without corresponding assistance ? Why start dispensaries for early diagnosis when there is nowhere to accommodate the cases ?

What is the use of *after*-care schemes when there are no facilities for *care* ?

Hospitals for the tuberculous must come first, dispensaries and after-care organisations later.

India has many advantages which we lack in England: a climate which lends itself to inexpensive buildings suited to the needs and habits of the people ; a strong sun which can disinfect; racial standards of nutrition which appear to correspond to inexpensive diets.

The cost of tuberculosis schemes need not be great if wise guidance concentrates upon medical essentials rather than upon administrative staffs and decorative buildings. And above all, well-trained and devoted doctors and nurses are needed, such as we see in the Mission Hospitals throughout the Empire: men and women working for the sake of duty and asking little in return.

Is this Conference to count for anything in this heavy task, or is our Coronation enthusiasm to end just in talk ?

Let us hope that the facts which have been put before us will create a public opinion and, perhaps, some kind of central organisation to insist that, in relation to this scourge of tuberculosis, our Empire shall not fail its children.

SECOND SESSION

CHAIRMAN: THE RT. HON. THE VISCOUNT DAWSON OF PENN, G.C.V.O., K.C.B., M.D., F.R.C.P.

THE CARE AND AFTER-CARE OF THE TUBERCULOUS AMONG THE EUROPEAN MINING POPULATION OF THE RAND

BY A. D. PRINGLE, M.D.

Medical Superintendent, Springkell Sanatorium, Transvaal.

THERE are four institutions concerned with the work of the gold-mining industry in respect of the tuberculous:

1. *The Springkell Sanatorium and Tuberculosis Hospital.*—This Institution is divided into three sections—one part for silicotics, another for early cases of tuberculosis, and a third for advanced cases. The Institution was built and equipped by the mining industry at a cost of some £70,000. It is administered by a Board of Management, comprising representatives of the mining industry and the Government. The annual cost of upkeep is about £20,000; the number of cases admitted in the year about 280; the discharges just under 200. Treatment is conducted on modern lines, with a recent tendency to expansion of operative procedure. Miners are treated at this Institution free of charge. Up to 1930 only miners had been admitted to this Institution. Between 1920 and 1933 other European males besides miners were admitted—up to then there had been no provision whatever for females, but from January, 1934, tuberculous European females were admitted. As previously stated, the miner is treated free of charge, but all those from the non-mining community pay fees, either themselves or the fees are paid by the local authority and the Government Public Health Department on a basis of fifty-fifty.

2. *The South African Institute for Medical Research.*—This was built by the mining industry some twenty years ago at a cost of £75,000, and the industry contributes £10,000 per annum towards the upkeep. This research institute, of which one of your vice-presidents, Sir Spencer Lister, is the director, conducts research work in almost every useful direction

in respect of medicine, but more especially in research regarding industrial disease and tuberculosis.

3. *The Medical Bureau of Examiners.*—This Bureau consists of some ten medical examiners whose duty it is to examine all those who apply for a ticket to undertake mining or underground work. They also conduct what are known as "the periodical examinations" for the working miners and also what are known as "benefits examinations" for those individuals who are applying for industrial compensation in respect of silicosis or tuberculosis. This Bureau of Examiners is appointed by the Government, and the administration is entirely in the hands of the Government—the mining industry has no say whatsoever in the appointment of personnel or the administration of the Institution. It is obvious that this is right in order that there may be no suspicion whatever that bias may influence the decision of the examining bureau.

4. *The Miner's Phthisis Compensation Board.*—This Board is comprised of members appointed by the Government with one representative from the miners and also a representative from the Chamber of Mines, who merely holds a watching brief on behalf of the industry. This Board was created as far back as 1904—it really acts as the executive for carrying out the provisions of the various compensating Boards respecting the industrial disease of miner's phthisis.

It will be observed from the foregoing that so far as hospital treatment and medical research work is concerned the mining industry has taken most of the burden. Now, the members of the mining industry early realised that the conduct of its affairs would be haphazard and disjointed were each mining company to act on its own. The various mining companies, therefore, have a representative or representatives on what is known as the Chamber of Mines Committee. This Committee negotiates with the Government, with the Mine-Workers' Union, and is responsible for the general policy of the mining industry of the country.

All Europeans wishing to take up mining as a profession must first of all be examined at the Medical Bureau and get passed as fit, when they get what is known as a "Red Ticket." All individuals examined for the first time are known as "Initials."

Approximately 20,000 initials are examined annually. The Bureau examiners undertake all the periodical examinations in respect of miners. Miners must be examined once every six months, in order that a record may be kept as to whether they are still in good health, whether they have developed silicosis or tuberculosis. Immediately the very slightest degree of silicosis or fibrosis is detected a miner is warned of his condition, and he is at liberty to take the warning and leave underground work or to carry

on. Regarding tuberculosis, however, as soon as this is detected the miner is *compelled* to leave underground work—this in his own interest and with the object of preventing infection to other underground workers.

The factor of silicosis is mentioned here solely because past experience has shown that a great many silicotics develop tuberculosis. A silicotic man who has silicosis in any of its stages and develops tuberculosis as a complication is immediately put off work and receives a pension varying from £12 to £22 a month—the variation being affected by the wages he earned, whether he is single or married, and, if the latter, the number of children dependent on him under the age of sixteen years.

Tuberculosis, " according to the Act," among miners comprises both open and " closed " pulmonary tuberculosis.

The underground worker who is suffering from pure tuberculosis receives a lump sum payment of some £600 to £700, but has no legal pension. Within the last few years, however, a practice has been established of giving these tuberculosis cases what is known as an *ex gratia* grant at the discretion of the Miner's Phthisis Compensation Board. The Board receives all its funds in respect of compensation by a levy on the gold-mining industry, not only for its immediate needs, but large sums are invested to make provision for lump-sum compensation, pensions, and *ex gratia* grants in future years. Since its inception the Miner's Phthisis Board has paid out in compensation a sum of £11,000,000. It is estimated that during this year the annual expenditure will be £1,000,000.

Every European miner is put off work on the contraction of tuberculosis and silicosis or pure tuberculosis. In addition to any benefits in the way of lump-sum grants or pensions, which he draws from the Miner's Phthisis Compensation Board, he also gets a lump-sum payment from what is known as the Provident Fund. The amount varies according to the wages drawn by the individual, the variation being between £100 and £500.

This matter of monetary compensation is not the whole story, since the gold-mining industry voluntarily undertakes to help ex-miners in the following directions:

1. If these ex-miners are still able to do light work employment is found for them on the surface.

2. Large money grants are made to industries with the guarantee that such industries will employ, where possible, the children of ex-miners.

3. The children of ex-employees have first call to be engaged as apprentices in the mining industry.

4. Through the Miner's Phthisis Board Administration money is invested in land, where suitable individuals are placed as farmers.

5. The children of ex-miners are afforded facilities in training as

typists, dressmakers, etc., all books and fees being provided by the gold industry.

6. An Employment Bureau is conducted solely with the purpose of obtaining employment for ex-miners.

Further, if an ex-miner is living at a considerable distance from Johannesburg he is provided with his train fare in order to attend the Medical Examining Bureau to ascertain his condition in respect of further compensation or pension. In the event of death the funeral expenses are paid by the industry. Part of the ex-miner's pension is continued in respect of his widow and all children under the age of sixteen.

Further, should a miner have to give up underground work owing to some disability not concerned with mining, if he be in needy circumstances, he is given an *ex gratia* grant to provide for his needs.

It would be entirely wrong if this contribution on industrial tuberculosis in the gold-mining industry on the Rand gave you the impression that it was a rich industry and that it was thus easy to make provision for care and after-care. It is true that in all schemes of care and after-care adequate financial provision is two-thirds of the battle; but, after all is said and done, most mining ventures are commercial propositions, some pay better than others, but the fundamental truth with regard to the Rand gold industry is that the direction of the industry is in the hands of sound business men who are fully aware of the industrial risk in mining and realise that adequate provision must be made for those who contract either silicosis or tuberculosis. Any haphazard scheme would have been disastrous both to the mines and workers. An important point is that in the provision of funds the requirements of future beneficiaries are fully provided for.

Some Statistics.

A year ago there were some 5,000 beneficiaries, divided more or less equally into cases of very early fibrosis, a medium fibrosis section and a last section of advanced incapacitated cases, most of them cases of pulmonary tuberculosis.

There has been a reduction of 20 per cent. in the production-rate of silicosis which will eventually mean a reduced tuberculosis prevalence.

All those miners who have been engaged since the establishment of the Examining Bureau in 1916 are known as the "New Rand Miners," and the tuberculosis prevalence among them is approximately the same as that among members of the Royal Air Force. Speaking generally, there has been a fall of from three to one per thousand in tuberculosis prevalence among the European miners.

THE CARE AND AFTER-CARE OF THE TUBERCULOUS AMONG THE EUROPEAN NON-MINING POPULATION OF THE TRANSVAAL AND NATAL

With regard to the European population, male and female, it may be taken that the two institutions previously mentioned—the Springkell Sanatorium and Tuberculosis Hospital and the South African Institute of Medical Research—render the same services in respect of the general community as they render more specificially in respect of employees of the mining industry.

1. *Springkell Sanatorium and Tuberculosis Hospital.*—The patient who is found to be suffering from tuberculosis is sent to the sanatorium forthwith, if the patient is able to pay his or her own fees. Where the patient has to come in as a free or part-paying case, application is made to the local M.O.H., who, after due enquiry, sends the patient to the sanatorium. There is, in practice, no limit in respect of the duration of residence. The results are on the whole satisfactory, more particularly since modern operative methods have been introduced. One of our difficulties at Springkell is not that we have too little sun, but that we have, particularly during the summer months, too much. Springkell is situated five miles from the northern boundary of the city of Johannesburg, at an altitude of nearly 6,000 feet; the climate for the most part is cool and bracing, with short periods of cold weather during the two months of July and August.

2. *The South African Institute of Medical Research.*—It carries out the routine examination of sputa, the pathological examination of lungs, and the biological determination in respect of tuberculosis.

All the hospitals in the Transvaal and Natal admit, as a temporary measure, cases of tuberculosis pending their transference to a sanatorium or specialised hospital.

Care and After-Care.—The best care and after-care organisation that I know of is that existing in the Cape Town area. In the Transvaal and Natal there is nothing approaching it in efficiency, but beginnings have been made. The Natal Anti-Tuberculosis Society has done extraordinarily good work, not only in respect of propaganda and the collection of funds, but they have stirred up public opinion regarding the danger of tuberculosis to the community, and it was to a large extent the influence of this society which induced the Government to build a sanatorium and hospital at Durban.

T.B. Clinics have been established in the two leading towns in Natal.

In the Transvaal, wherever possible, whole-time Medical Officers of Health are appointed, and in the larger boroughs one of the medical staff

devotes his special attention to the prevalence of tuberculosis in respect of the early treatment of cases as they arise and personal investigation as to the economic and living conditions where a family is involved.

In all the Provinces of the Union of South Africa there is a committee engaged in collecting for "The Christmas Stamp Fund." Not only are these funds going to be of tremendous help when required, but the work of propaganda has served to educate the public. In Natal a "Preventorium" has been built for the treatment of what is called the "pre-tubercular" child.

In 1935 the King George V. Jubilee Fund was established with a view to providing means to make suitable provision for the family of those wage-earners who were incapacitated from tuberculosis. The revenue is divided *pro rata* between the four Provinces of the Union.

In January of this year, in Johannesburg, a Tuberculosis Advisory Council was established with the object of collecting data and directing policy in respect of tuberculosis in the Transvaal; the members of this Advisory Council are doctors specially interested in tuberculosis, and, in addition, the health officers of the larger towns.

TUBERCULOSIS AND CITY ENVIRONMENT

By S. VERE PEARSON,
M.D.(CAMB.), M.R.C.P.(LOND.)
Chairman of the Joint Tuberculosis Council.

I PROPOSE to preface my address on Tuberculosis and City Environment with a few remarks about the functions of our Joint Tuberculosis Council. This is a central council co-ordinating all the medical bodies in the kingdom interested in tuberculosis. It provides a representative body, a committee of thirty, to which questions pertaining to tuberculosis can be referred by Government departments, local authorities, tuberculosis workers, societies and others—a body which gives advice and promotes study and research. It works largely by splitting itself into small committees which report to the main council. This meets only three or at the most four times a year. In other parts of the Empire it may be advisable to have other than doctors on such a body. But here that is deemed inadvisable. On the other hand, some of its memoranda might with advantage be circulated more widely than they are to the laity, especially to those serving on Government and county council tuberculosis committees.

Now to pass to tuberculosis and city environment. There are three elements in city environment which are associated particularly with the way a few big cities have been growing very fast in recent decades at the expense of smaller towns and of rural districts. These are: (1) The growth of the amount of travelling that is entailed in getting daily to and from work; (2) the lack of facilities for recreation in the open air; and (3) the sense of irritation and anxiety which is so frequently associated nowadays with vocations followed and circumstances encountered in big towns. Each of these has a hurtful effect upon health and predisposes to tuberculosis.

In the after-care of the tuberculous, experience from Papworth and from other tuberculosis colonies has abundantly demonstrated the importance of healthy conditions of living and working. Equally important are such conditions as a preventive against the ravages of this disease. A brief examination of the overgrowth of cities, of the causes producing such overgrowth, and of how to overcome them is not beside the point. That examination, however, is too big a subject for the present occasion. I shall merely point out, therefore, that a great deal could be accomplished by the decentralisation of industries and the redistribution of population in self-contained towns of small dimensions. The idea of garden-cities, where town-life can be healthy through its interpenetration by the amenities of the countryside, is an old one. The establishment of garden-cities and of satellite towns, where industries would be planted close to well-planned housing estates and shopping and culture facilities on land held in trust for the community, would do much to bring about a diminution of tuberculosis. It would, too, draw renewed attention to the all-important social and economic factors which produce disease.

Let me start my advocacy of such methods of redistributing population along lines which are likely to improve health in general and diminish tuberculosis in particular by giving a few figures of tuberculosis death-rates per 100,000 in various places in England:

Manchester City (congested "Clearance" Areas)	197
Manchester City	104
England and Wales	76
Wythenshaw (Manchester's satellite town)	72
Norfolk (purely rural)	60
Herts county (a more or less rural district)	46
Letchworth (a garden-city)	38

Some of these figures have been published by Dr. Norman Macfadyean in *Town and Country Planning* (March, 1937, p. 61). They are recent tuberculosis death-rates, five-year averages. From the above table it can be seen

that the death-rate from tuberculosis in a satellite town not far removed from a big city (Manchester) is not far short of a third of that of a congested district in the middle of that town and that the death-rate in a garden-city is well below that of two rural districts. Again, here is a striking fact about the tuberculosis death-rate for London, a comparatively healthy city : In the area called the County of London the death-rate from tuberculosis was 30 per cent. higher in 1930 than that of the other 35 million people of England and Wales, 13 million of whom live in important cities and the other 22 million who live in smaller towns or in the country. Now the growth of London, like that of a few other big towns, has been phenomenal in recent years. Yet not far away from London is that brilliant pioneer example of a self-contained, happy and healthy garden-city, Letchworth. There over-crowding, polluted atmosphere, unhygienic factory conditions, etc., are not to be found. But in addition to the absence of such circumstances of environment are to be discovered the presence of the three advantages which I first named at the beginning of this paper, namely: (1) proximity to the place of daily work, (2) to suitable spaces for exercise in fresh air, and (3) a more leisurely attitude towards, and a greater satisfaction in life than is usually present amongst the masses in a great city.

People do not realise how fast Greater London, and similar big towns, are growing. Every thirteen weeks for the last ten years more than 18,000 people have been added to Greater London, and for the past fifty years more than 50,000 per annum. It is true that since about 1900, or earlier in a few boroughs, the numbers of actual inhabitants have fallen somewhat in several of the more central districts of London. But this does not mean that open spaces and fresh air have increased, and that the day-time density of the population has decreased. Far from it. Though actual numbers have decreased in the two centrally placed boroughs of Stepney and Shoreditch, when the survey to discover facts about the conditions of overcrowding was made in 1936, overcrowding was found to be worse in these two districts than anywhere else in London. London and the neighbourhood of London has absorbed more than three-fifths of the 2,364,000 increase of population which has occurred in Great Britain between 1921 and 1934, for 1,674,000 persons of this increase live in London and the south-east of England. Think what this growth of London means in terms of travel to and from working-places, compared with what would be entailed if a great proportion of these increased numbers had been housed and did their daily work in self-contained garden cities or satellite towns. The following facts are not generally realised: There are more persons in London, with their dependents, occupied in carting others about than the

entire population of Norwich and Bath together. An average London family spends about a twelfth of its income on bus, tube, train, and tram fares. Greater London is about thirty miles across. Since the war the open country is five or six miles further away from the centre of London than it was. Playing-fields to be reached easily have become a lost hope for many. Dr. T. O. Garland, in the journal *The Human Factor*, and elsewhere, and I myself in a previous paper, have enlarged upon the physical, financial, and mental strain of this daily scramble to and from work and upon the direct effect upon the incidence of tuberculosis. So I will not dilate upon it now.

I have said little hitherto about the restlessness, anxiety, and mental strain which nowadays is so prominent a feature amongst a majority of town-dwellers. These are peculiarly post-war symptoms of ennui due to unemployment, to monotony of work, to lack of satisfactory outlet for some of the most important primary instincts, and to inability to gain pleasure through occupations which lead individual producers to feel they are exercising their innate constructive abilities. Also the sense of bustle, the noise, and the pace of work in big cities all conduce to irritation and fatigue, which I am convinced predispose to tuberculosis. Coupled with these things, all too often, goes an absence of satisfying hobbies and of healthy recreations. All these adverse influences are more rife in overgrown towns than in a garden-city or in rural districts. Their action is to be seen in countries where tuberculosis has not been endemic for so long as in England, more clearly and in cruder forms. In these places, and to some extent elsewhere, they can be ascribed largely to an altered kind of work and to what may be called "divorce from Nature." That splendid epidemiological monograph, one of the most important ever published in connection with tuberculosis, coming from the South African Institute of Medical Research (March, 1932), makes clear how a change to an entirely new occupation influences this disease. Again, in India, from figures published ten years ago in the *Transactions of the Seventeenth Medical Congress of British India*, the influence of unhealthy sedentary occupations in towns is demonstrated. The highest mortality occurs amongst shopkeepers, servants of the Government or of private people, amongst weavers, shoemakers, tailors, etc., and especially amongst females secluded indoors occupationally or by the purdah system. The mortality for shopkeepers is ten times higher than for agriculturists. Now in India, up to comparatively recent times, industrial workers often go back to agriculture after a time. This is due to different habits and customs of life amongst the masses and to the slow march of the industrial revolution compared with its rapidity in Great Britain. The inhabitants of India are more closely wed to the soil, to family ties, to caste

restrictions, to hide-bound traditions, to ancient custom and to the village of their birth. They will not readily take to urban life permanently. Industrial development has had to take cognisance of these things, and many of them are factors which influence tuberculosis. Again, the problem of allergy and immunity is entirely different in the West from what it is in the East. The conditions of factories, too, are much more satisfactory in England than in the East.

A sound assessment of the effects upon tuberculosis of the different factors in city environment can best be accomplished, for the reasons which have already been indicated, by making the survey of these factors over as wide a geographical area as possible. There are further reasons for this. A mention of two of them is in the nature of a warning. Wrong inferences may be drawn from a study of comparative figures from town and country districts unless account be taken of the answers to the two following questions, since these may affect the figures materially: (1) How recent has been the introduction of the disease into the community in question? and (2) What degree of closeness of contact is there with those who are harbouring and very possibly disseminating tubercle bacilli in the particular district?

In emphasising quite briefly some of the factors affecting those living in urban districts I have mentioned a few to which attention has not been frequently called. But it must always be recognised that there is generally a combination of several influences at work. Factory workers in Indian cities, shopkeepers and industrialists in the cities of Eastern Canada, mine workers in South Africa, may be occupied in surroundings which are not too healthy, they may be following pursuits to which they were formerly unaccustomed, they may be adopting modes of life profoundly affecting their familial and psychological state, but they may also immigrate to a city environment from districts whose inhabitants have not acquired high immunity from long contact with tuberculosis, or they may be so circumstanced that they dwell or work in close contact with persons who are disseminating the bacilli. Whichever of the hurtful influences are counted important, social and economic factors are seen to be those which require most attention if preventable disease is to be banished. As with after-care so with prevention, the problem of lessening the ravages of tuberculosis is again and again the problem of providing healthy conditions of living and working.

TUBERCULOSIS AND CITY ENVIRONMENT

By FREDERICK HEAF,
M.D.
Principal Assistant Medical Officer, London County Council.

With your permission, I propose to describe very briefly the main purposes of the London County Council Tuberculosis Scheme, and then discuss one or two points connected with after-care. The L.C.C. Scheme falls into three divisions: (1) Domiciliary Treatment, (2) Dispensary Service, and (3) Residential Treatment.

Domiciliary treatment is regarded as the function of the medical practitioner and the insurance practitioner. To these two the services of the Tuberculosis Officers are available for consultative purposes.

The dispensary service, which includes the care and after-care of patients through the agencies of care committees, also provides dispensaries for the diagnosis and observation of cases, for the examination of contacts, and special forms of treatment such as A.P. refills and tuberculin. It is also an information bureau and an educational centre.

Residential treatment is the direct concern of the London County Council, and is now provided free to tuberculous patients, although voluntary contributions are accepted when offered.

It may be helpful to emphasise the peculiar conditions which exist in London as part of the County Council's Tuberculosis Scheme. Each Metropolitan Borough Council maintains a tuberculosis dispensary in its area, subject to the approval of the London County Council, which makes an annual contribution toward the expenditure incurred by the Borough on schemes approved by the London County Council and carried out to their satisfaction. There are in London twenty-six municipal dispensaries, eight attached to voluntary hospitals and one under voluntary management. Although the Borough Council administers the dispensary service, the London County Council provides, or arranges for, all residential treatment. You will see, therefore, that there is a dual control which needs considerable co-operation and co-ordination to work satisfactorily.

After-care work is a part of the dispensary service, and is generally under the control of a voluntary committee consisting of members experienced in social welfare work assisted by the Borough Medical Officer of Health, the Tuberculosis Officer, and various members of the staff of the Borough Public Health Service.

Its function is the organisation of measures auxiliary to treatment, and it forms an essential part of the co-ordinated measures for combating the disease. In addition to matters connected with the economic position of the family, it deals with housing conditions, employment, and occupational therapy, and in a number of boroughs handicraft classes, educational classes and home employment centres have been established.

The great problem of finance is always a severe handicap to the many plans and schemes which a progressive care committee may devise for the alleviation of the lot of the tuberculous within its area, and the fact remains that provision of suitable employment and the organisation of occupations in special workshops for the post-sanatorium patient under domiciliary treatment is (probably on account of its difficulty) a sadly neglected part of the tuberculosis schemes both in London and the provinces. In London a voluntary body assisted by the London County Council has established two workshops known as the Spero Industries, which employ patients in leather and woodwork, and a number of the boroughs have handicraft centres, but these are small efforts in comparison to the need that exists.

At most of our hospitals and sanatoria the value of occupational therapy has been fully recognised, and it seems to me that much more should be done in establishing centres for the employment of patients who (although they have little or no economic value in normal industry) could make use of the training they have received during their residential treatment.

For youths we have the scheme of the National Association for the Prevention of Tuberculosis at Burrow Hill, where boys from the ages of sixteen to nineteen are treated for two years, and at the same time trained in clerical work and gardening so that they may be fit both physically and mentally to take up suitable work in the future. In this colony it is interesting to note that, taking the figures for the last seven years (that is since the institution opened), 165 out of 187 of the trainees are traceable, and of these 87 per cent. are fit and working, and of these 57 per cent. are working in the occupation for which they were trained, which seems to justify the continuation and even the extension of the experiment. (I have the kind permission of the Medical Superintendent, Dr. MacPhearson, to quote these figures.)

Another of the duties of after-care committees is to give such advice and assistance to the family and the patient as the circumstances of the case dictate, with a view to enabling the family to adjust their circumstances to the new conditions.

It is our duty as medical officers to direct and guide the care committees on the nature of any advice which they may be called upon to give to a patient. In connection with this thought, I was struck by two investigations which I came across the other day.

The first is by my chief, Sir Frederick Menzies,[1] in his annual report to the Council in 1926. In that report you will find the death-rates from tuberculosis compared with the death-rates from all causes: firstly, in three London boroughs with better-class, intermediate-class, and poorer-class inhabitants respectively; secondly, in successive decennia for the whole of England and Wales over a period of thirty years; and, thirdly, from the three divisions of the country—namely, rural districts, urban districts, and county boroughs.

Now, although the actual mortality from all forms of tuberculosis is highest in the poorer-class borough, the first decennia and the county boroughs, when the mortality from tuberculosis is taken as a percentage of the mortality from all causes the figure is practically constant, and is hardly affected at all by the different environment or the time-factor.

In other words, this means that the mortality from tuberculosis varies directly with the mortality from all causes, and environment and social conditions do not seem to have any *selective* effect on relative mortality from tuberculosis. The same factors which create an increase in the number of deaths from tuberculosis operate in a similar manner in increasing the number of deaths from all causes.

I know that the actual cause of breakdown in tuberculosis is still obscure, but I think that the fact I have quoted is evidence that infection is not the chief item to be considered in prevention and after-care. Fatigue and under-nourishment probably call for greater attention in a civilised or mechanised community. Probably Osler was right when he said: "The cure of tuberculosis is a question of nutrition; digestion and assimilation control the situation." It is the soil and not so much the seed that matters.

The second set of figures are reported by Bashford[2] in *The Lancet* (November 7, 1936). These show that the average rate of incidence of pulmonary tuberculosis for all *outdoor manual workers* in London and the provinces is greater than in the case of indoor non-manual workers, the figures for the years 1920-35 being:

Outdoor manual:	
London	1·92 per 1,000
Provinces	1·56 " "
Indoor non-manual:	
London	1·21 " "
Provinces	1·06

well known to you, but not always appreciated by after-care committees and social workers. But the figures do more than that. They show that the class which endures the hardest physical strain and receives the lowest wages and spends the smallest amount on food is the one most prone to tuberculosis. Again, we have evidence pointing to nutrition and fatigue being chief factors in prevention of onset of tuberculosis and naturally, it follows, in the prevention of relapse of a patient with a quiescent lesion.

I cannot help feeling that the vast majority of adult people (assuming that they do not receive a very massive dose of tubercle bacilli) will remain free from active tuberculosis even if they come into contact with the infection quite frequently, providing they are well nourished and, most important of all, that they are not subject to excessive physical or mental strain. I do not mean by this that we can completely disregard infection. Children present a different problem to adults and demand all our efforts to protect them from the bacillus, but I do mean that it is more important for those responsible for after-care schemes to ensure that patients and those in contact with them are properly nourished and free from anxiety and physical overstrain than to be too anxious about the few tubercle bacilli which may escape destruction after reasonable precautions have been taken.

In the settlement at Papworth, I think, and I hope Sir Pendrill agrees with me, that the freedom from relapse of the settlers, and the extremely low incidence of tuberculosis amongst the patients' families settling there, are due to the fact that the problems of under-nutrition, physical strain, and mental anxiety have been practically eliminated from their lives.

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ENVIRONMENTAL FACTORS IN CARE AND AFTER-CARE

By SIR PENDRILL VARRIER-JONES,

F.R.C.P.(LOND.)

Founder and Medical Director, Papworth Village Settlement.

The first is by my chief, Sir Frederick Menzies,[1] in his annual report to the Council in 1926. In that report you will find the death-rates from tuberculosis compared with the death-rates from all causes: firstly, in three London boroughs with better-class, intermediate-class, and poorer-class inhabitants respectively; secondly, in successive decennia for the whole of England and Wales over a period of thirty years; and, thirdly, from the three divisions of the country—namely, rural districts, urban districts, and county boroughs.

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Provinces	1·56 „ „
Indoor non-manual:	
London	1·21 „ „
Provinces	1·06 „ „

It will be noted that the stress and strain of London produces higher figures than the provinces in each class.

These figures are a severe criticism of the old idea that an open-air occupation is essential for the tuberculous patient, a criticism probably

well known to you, but not always appreciated by after-care committees and social workers. But the figures do more than that. They show that the class which endures the hardest physical strain and receives the lowest wages and spends the smallest amount on food is the one most prone to tuberculosis. Again, we have evidence pointing to nutrition and fatigue being chief factors in prevention of onset of tuberculosis and naturally, it follows, in the prevention of relapse of a patient with a quiescent lesion.

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ENVIRONMENTAL FACTORS IN CARE AND AFTER-CARE

By SIR PENDRILL VARRIER-JONES,
F.R.C.P.(LOND.)
Founder and Medical Director, Papworth Village Settlement.

It is my privilege to address you this afternoon on the environmental factors in care and after-care. Before I begin I want to suggest a new view of the word "environment" itself. I think that perhaps our conception of the word has hitherto been inadequate, and I want to indicate how this inadequacy mars many of our efforts.

It is so often taken for granted that the term "environment" refers only to the physical or material surroundings of the tuberculous and to nothing else, that it may not be out of place to begin by examining the other factors which make up (1) the ideal environment of those suffering from tuberculosis, and (2) the environment which is supposed to act as an auxiliary factor in producing the disease.

Now if material environment alone governed the incidence of the disease, we should expect to find that all consumptives admitted to our public and private institutions had been living in unhealthy conditions.

Yet this is not so. Too often men and women contract the disease even though their standard of living is high, their housing hygienic, and their working conditions excellent. We are apt to blame each of these material conditions in turn. When a patient is discharged from an institution we lay stress upon each of these factors and yet to our astonishment relapses very frequently occur.

It has been brought home to us at last that something much more fundamental and vital lies at the bottom of these puzzling phenomena; and we are giving up the practice of tendering the advice which we used to give in the past, when we assured our patients that good housing, a good food supply and a light job in the open air would solve their problems.

Most of you will recall the astonishing outcome of an examination of the results of one of our recent rehousing schemes. Families removed from almost insanitary houses, when placed in modern ones had a higher disease incidence-rate and a higher death-rate than those who were allowed to remain in their old homes. Why was this? The explanation was that the new houses and the new and better environment demanded a higher standard of living. Not only was the rent higher, the whole scale of existence was more elaborate. Inessentials suddenly became essential, if a sense of inferiority was to be avoided. New avenues of expense were opened; and the amount of income available for basic necessities, such as food and warmth, was accordingly reduced.

It is our duty to learn from our experience, and to my mind this survey teaches clearly that it does not by any means necessarily follow that in raising the standard of living we are raising the standard of resistance to disease. Very often, indeed, the opposite is the case, and the present increase in the notifications of tuberculosis in young female adults constitutes an unwelcome but inescapable testimony to the truth of this disagreeable paradox.

We must evidently accustom ourselves to regard tuberculosis not merely as an infectious disease caused by the tubercle bacillus but as a disease which has its roots in our social structure. To regard it from a

purely medical point of view is as wrong as it would be to ignore the bacillus itself; and it seems that we must now revise and extend our conception of the term "environment." It is surely much more than bricks and mortar and ventilation. What is the missing factor?

We now know that a definite, although as yet undetermined, maximum or massive dose is necessary to produce clinical disease. We know, too, that the extent of this maximum dose depends upon and varies with the patient's powers of resistance. What governs these powers? Not merely good material conditions, not merely physical exercise, whether organised or otherwise, but a mental state. Here is the true diathesis. This mental state is of the utmost importance. It is produced by an imbalance of our endocrine system, and that imbalance somehow upsets and undermines resistance to disease. The means by which this mechanism operates need, in my submission, to be carefully and exhaustively studied, and I would like once more to urge that research of an intensive character on these lines ought, without delay, to be undertaken.

That results of far-reaching importance would ensue I am sure, and from my experience at Papworth, where for over twenty-one years we have been able to observe the daily reaction of consumptives to their environment, I am confident that much more than material conditions are responsible both for their well-being and for their success or failure in keeping disease in check. Strange as it may seem, enforced leisure may spell disaster, a disaster moreover which could easily be avoided if the psychology of the patient were taken into account at an early stage of treatment. Enforced leisure means in too many cases the destruction of moral fibre. I use the word "destruction" advisedly. I do not mean impairment, for what is impaired can usually be repaired, whereas moral fibre, once destroyed, is irreparable. This destruction is due to the fact that as medical men we have paid attention to the lesion in the lung and to that alone, and have neglected the organism in which the diseased lung resides.

Please do not misunderstand me. I do not advocate indiscriminate or forced exercise. That is fortunately a thing of the past; but it is still believed by some that work simply as a therapeutic measure, as a means of producing an auto-inoculation of the patient with his own tuberculin, is beneficial. This is not so. It never produces and never will produce the cure of the individual. Marcus Paterson's wonderful work was a psychological exercise of the utmost importance, the significance of which perhaps he himself never fully appreciated. While he himself was present, with his tremendous enthusiasm, remarkable cases of the arrest of the disease were recorded. When, on the other hand, purposeless work was made a routine in our sanatoria the results were not nearly as good. The

force of a great personality was missing and the results were correspondingly poor.

Thus in the actual treatment of the consumptive the environment must have something psychological about it. There must be an atmosphere of encouragement, and, as Sir James Kingston Fowler was fond of quoting: "Hope and work produce vitality." Neither of these alone will produce the required results; and indeed hope, without realisation, when coupled with work, will have results quite other than those intended.

What then are we to do? Surely our new conception of environment must provide a set of circumstances calculated to produce what we all recognise under the term "well-being"? Material conditions alone cannot produce this result. The mind must be at ease too. The consequence of mental ease is surely the preservation or restoration of the endocrine balance. Admitting that this is so, is it not evident that in the degree in which we can create the conditions for "well-being," in that same degree we maintain, or re-create, resistance to disease?

We all know, alas, that a time is reached when even the most favourable environment—using the word in its widest sense—fails in its purpose; but this period is not to be determined by the physical signs in the lung. I have from time to time protested that we are misled by physical signs when we ought really to be guided not by the destruction of lung tissue—which is simply the end-result—but by the changes which take place in the body fluids. These changes end in lung destruction; but at first they show themselves in a toxæmia, and this unfortunately we are too often too late to check.

It is curious that so few people have paused to ask the simple question: "Why is after-care necessary?" Dare we admit that it is because we cannot cure, and in many cases we cannot even permanently arrest, tuberculosis by our present methods? So often our treatment fails to arrest permanently, or to cure completely. Hence this elaborate system of "after-care." And the strange thing about the matter is this, that the longer the case is under treatment, the more elaborate that treatment is, the more is "after-care" essential. We should have supposed that it would have been otherwise, but a moment's thought will make the matter clear. Modern methods of treatment, so different from the simple sanatorium routine of twenty or thirty years ago, have prolonged the lives of a great many people. Thus considered, modern methods have justified themselves, but since these methods only admittedly arrest the disease and do not cure it, it is still more essential than ever that the patient should go after treatment to a proper environment. Dead consumptives infect no one, live consumptives may infect many.

We have already considered the conditions which have to be available to enable the disease to be arrested with any hope of permanency. Good housing is one factor, but a good house with a worried mind, with a frustration which cannot be dissolved, is of little use; that well-being of which I have spoken will not exist, and disaster will only be postponed. Work is essential, but work of the right kind; for a middle-class or working-class patient has something to sell, something which he must sell, in exchange for salary or wages, if his well-being is to be assured. It is fatal to his (or her) well-being to be transferred from one group of society to another. Our "after-care" schemes hardly ever seem to take this very important point into consideration. It is unreasonable to expect anyone to maintain this essential feeling of well-being when degraded from a known occupation to one considered inferior. Similarly, it is equally disastrous to thrust responsibility upon one who is unused to it. Under such strain he breaks down very rapidly. If he is, for example, a machine-minder—and so many working-men are machine-minders these days—he will resent or become anxious over work requiring even the very minimum of initiative. He is not used to it; he has not been taught to use his brain in that way; he becomes morose, loses his sense of well-being, and breaks down. The disease re-asserts itself, and the weary medical routine starts all over again. It would be well for "After-Care" Committees to consider these points. There are many more, such as the question of wages for work done, which is one of the most crucial.

Simple common sense often dictates the line of action. When a man becomes a consumptive it does not necessarily follow that he simultaneously becomes a philanthropist. Many committees imagine that such a man should give his labour to the cause. They do not realise that his labour is the only asset he has. Why should he give it away? Surely it would be far better to organise the work so that it may be able to afford decent wages for him. He does not wish for charity; he wishes only to have work—paid work—and he can then discharge his debts and his obligations in the normal way. Too often we cling to the mediæval outlook when we deal with diseased or disabled persons, and regard them as inferior creatures. That frame of mind must go. The man or woman who has contracted tuberculosis has done nothing wrong. On the contrary, he or she is frequently a victim of our present civilisation—and this is most certainly true in relation to those of the native races of the Empire who have had the misfortune to become tuberculous. It is not for us to despise them, but rather it is our duty to try to compensate them for the wrong which society has done to them. This we can best do, not only by restoring their working capacity, but especially by contriving the kind of environment which

has been postulated, so that the sense of well-being—so easily lost, so vital to regain—may be recovered. The result will be cheaper than hospitalisation both in cash and in morale.

It may be asked why the medical profession should concern themselves with these matters. Is the physician to be a "jack-of-all-trades," with a little knowledge of medicine, a little knowledge of sociology, and a little knowledge of economics? My answer to this must be prefaced by another question: Is it not true that unless sociological and economic factors are correlated with medical treatment, the tuberculosis problem is, in the present state of knowledge, insoluble? If the answer is in the affirmative then surely the medical profession must so concern itself; but it need not do so unaided. The patients are not fools. They know exactly what they want; they know where they stand both socially and industrially; they know, indeed, every factor except the clinical one. That is where the physician comes in; and while it is beyond question desirable that he should know something of humanity and human aspirations, something of wages and hours and the problems of management, if he will co-operate with his patients, using and supplementing their knowledge and letting them use and supplement his, he will succeed in assisting them rapidly and surely towards recovery.

A further question which may arise is: Why should the State concern itself with tuberculosis and the fate of tuberculous patients?

The answer here is simpler: The State demands notification of the disease. Why? To protect itself. But in protecting itself in this way it may be putting in peril the livelihood and the whole social structure of the patient. All his work, all his efforts, his home, his job—all are liable to be prejudiced by notification. If the State demands protection at such a cost, surely it must accept the liability of providing adequate compensation. This liability must not be lightly discarded. The State provides treatment as it should. It cannot guarantee the results of treatment, of course; but surely it can see to it that the victim of the disease, if he cannot be cured, can at least be provided with employment in a suitable environment.

If such employment in such environment be accepted, three things immediately follow. First the State is further protected from infection; next the patient's family is, as far as is humanly possible, protected also; and thirdly a load of hopeless frustration is lifted from the shoulders of the patient himself.

It will be said that however desirable these things may be, what is desirable is not always obtainable. For one thing, there is the question of finance. How can the State accept such a burden? But is it a burden?

Which is the cheaper, to send a patient in and out of public sanatoria at the State's expense, often for a period extending over several years, or to erect hostels, houses, and workshops around selected existing sanatoria so that patients may earn in sheltered conditions up to one hundred per cent. of their maintenance? There is but one answer to this question. But there are still those who will enquire how the capital is to be found. A moment's consideration will indicate the solution of this problem too. It is simply a matter of capitalising the savings effected.

It costs more than £50 a year to maintain a small family in idleness; but that £50 if applied to the service of a loan would amortise £500 at 5 per cent. in fifteen years. Much of this is already evident to those who suffer from the inadequacies of the present system; and if greater facilities for the recovery of well-being and consequent health are not provided, we shall have to deal with a great number of men and women who have a definite and considerable grievance. The Ministry of Health, I think, fully recognise this, because from time to time in no uncertain terms they have pointed the way to the adoption on a wide scale of the Village Settlement idea. It is the logical completion of the tuberculosis treatment scheme, and as time goes on it becomes more and more necessary. We are prolonging the lives of consumptives. To send those consumptives home to unhygienic dwellings, to unsuitable working conditions, to mix with healthy people whose resistance is probably all too easily undermined—surely this process stultifies the whole effect of notification and renders nugatory all the sacrifices which we have demanded of the notified. Notification itself benefits not only the State, but also those patients whose disease is discovered early enough for permanent arrest to be secured by normal methods. Such patients are, however, in a minority; and what of the others? More than anything else they need the right environment. Can we not resolve that they shall have it?

THIRD SESSION

CHAIRMAN: THE RT. HON. LORD HORDER OF ASHFORD,
K.C.V.O., M.D., F.R.C.P.

THE FIGHT AGAINST TUBERCULOSIS IN WALES

BY D. A. POWELL,
M.D.(LOND.)
Principal Medical Officer, Welsh National Memorial Association.

WALES is a small country only 7,500 square miles in extent—that is to say, it could be sunk quite comfortably in one of the smallest of the Great Lakes of Canada, but what a loss to the world that would be!

On the other hand, it is so hilly that one of our bards, taunted with the relative insignificance of his little country, made the fierce reply that Wales might be small, but ironed out flat it would be bigger than England!

Its population is approximately 2,537,700. Except for the thickly populated, coal-mining, industrial area of the south, it is predominantly rural, inhabited by a hard-living, independent people, fond of music and sport (as other people know to their cost), tenacious of their traditions, and proud of their language, history, and ancient culture.

Although Wales has shared—but alas! not equally—in the general decline in the death-rate from tuberculosis shown by England and Scotland, the disease continues to take heavy toll of its population, particularly in the western and north-western seaboard counties which maintain with ease their melancholy pre-eminence in this respect.

The death-rate from tuberculosis in Wales in 1911 was 1,506 per million; in 1935, 925 per million; and in 1936, 860 per million; there has been a percentage fall since 1911 of 42·8.

Although substantial, the fall in the death-rate in Wales has not been as great as in England. Why?

It cannot be the germ. Even the most ardent Nationalist has not, as yet, isolated a Welsh strain of the tubercle bacillus!

No; it must be the national characteristics of the Welsh—*e.g.*, the intense conservatism of their social habits, the closeness and tenacity of

their family relationships, and their fatalistic outlook—which account so largely for the patchy distribution of the disease amongst them, associated as it is with a very high or a very low family incidence.

In Wales, broadly speaking, families are either free from the disease or riddled with it, and it runs in families because of excessive opportunities of infection rather than of an hereditary lack of resisting power, and certainly not because it is congenital, as so many of my countrymen still, unfortunately, think.

Apart from the liability to tuberculosis so characteristic of rural communities bordering on industrial areas, three of the main occupations of the country bring their own added risk—viz., coal mining (especially anthracite), quarrying (both associated with dust hazards), and seafaring.

As Professor Cummins has pointed out, the continuing liability to the disease in Wales is " much akin to what is observed in all countries where sharply contrasted types are thrown together, and where the old traditional culture is brought abruptly into contact with the new."

Again, so closely intermixed with ties of blood are town and country, country and town, that Wales, in dealing with a chronic infectious disease, such as tuberculosis, has to be regarded as a *unit*; the seed sown in Cardiganshire may come to fruition in Cardiff, and what is left undone in the industrial " valleys " of Glamorganshire be paid for in misery by the inhabitants of distant rural uplands.

To combat this scourge Wales, in 1911, rose to the height of its opportunity, and under the inspiration and leadership of Lord Davies of Llandinam decided to grapple with the problem on national lines under the ægis of the Memorial Association, which was constituted as a result of a National Conference held at Shrewsbury on September 30, 1910, for the purpose of inaugurating, as a tribute to the memory of King Edward VII., a national campaign for the eradication of tuberculosis.

The popularity of King Edward VII. and the practical humanitarianism of the proposed memorial aroused the enthusiasm of the whole nation, and a sum of over £300,000 was contributed by the people of Wales.

With the passing of the Insurance Act in 1911, the functions of the Association were extended by Parliament so as to include the administration of sanatorium benefit under that Act, and since then the seventeen county and county borough councils of Wales and Monmouthshire have delegated to the Association, on which they have a majority representation (about 70 per cent.), their obligations to provide treatment under the Public Health (Tuberculosis) Act of 1921, the assessment for this purpose being based half on population and half on rateable value. In 1912 the Association was incorporated by Royal Charter, and it has now become

to all intents and purposes a "Joint Board" representative of all the contributing authorities of Wales and Monmouthshire.

The main services undertaken by the Association include:

1. The provision of institutional treatment in five sanatoria and thirteen hospitals (containing in the aggregate 1,820 beds). In addition an average of about eighty beds are rented in outside institutions, such as the Prince of Wales' Orthopædic Hospital, Cardiff, Papworth, Preston Hall, etc.

These eighteen institutions are distributed in fair accordance with local needs, and the beds equitably allocated rather according to medical requirements than to financial deserts. The standard of treatment and management is good and on uniform lines, considerable elasticity is possible, and a high degree of differentiation of treatment is attained with resulting economy in capital expenditure and upkeep—*e.g.*, major thoracic surgery is centralised in four, and non-thoracic operative surgery (*i.e.*, of bones and joints, genito-urinary disease, etc.) in three of the large institutions; five institutions have completely equipped departments for treatment by artificial light.

2. The provision of dispensary or out-patient treatment. For this purpose Wales is divided into fourteen areas, which disregard, just as the tubercle bacillus does, local government administrative boundaries. The size of the areas varies roughly according to the density of population to be served. Each area is in charge of a Senior Tuberculosis Physician with one or more assistants. There are fourteen main clinics and eighty-five subsidiary clinics or visiting stations.

A considerable levelling up in accommodation and equipment has thus resulted, to the benefit of the poorer rural areas, and the services of a more highly trained medical staff are made available in the rural districts than would have been possible under the normal scheme based on a county as the unit.

The liaison between the institutional and dispensary sides of the work is extremely close:

Administratively through Head Office and the Principal Medical Officer.

Clinically through interchangeability of staff, the appointment of Tuberculosis Officers as visiting physicians, the appointment of Medical Officers of surgical institutions as officers in charge of the surgical After-Care Clinics, the carrying out of joint investigations—such as that into "Coal Miners' Lung" a few years ago, under the supervision of Professor Cummins—and the holding of periodic staff conferences.

As an example of the comparatively generous scale upon which the supply of highly technical equipment is rendered possible by a uniform and co-ordinated scheme may be mentioned the provision of X-ray facilities.

Except for three of the smallest institutions, for which facilities are available near at hand, every hospital and sanatorium has its own X-ray equipment. Altogether twenty-five X-ray plants, soon to be twenty-six, are owned by the Association. The Medical Staff have the right of user of five others, and in two other instances, by arrangement, X-ray work is carried out for the Association, a total of thirty-two. In even a remote rural county, such as Cardiganshire, for example, the Tuberculosis Officer has access to two X-ray plants of his own and the right of user of three others.

3. The establishment of clinics for the continued treatment and supervision of surgical cases, the country for this purpose being divided into five areas centring upon the five large institutions dealing with this type of case, under the control of Visiting Surgeons with special experience in this branch of the work.

4. The establishment of an Education Department to teach the community in general how to avoid tuberculosis, with a staff of three whole-time lecturers, full exhibition equipment, and nation-wide distribution of educational films such as the Memorial Association's own film, " Crusade."

5. After-care, which has been defined as the social and economic care of patients and their families, is still in a very rudimentary stage, and the question whether this should be carried out on national lines under the Association or locally by the contributing authorities themselves is under consideration.

6. The maintenance of a Central Research Laboratory, working in intimate accord with the treatment afforded by the Association, where constant investigation into the many problems connected with tuberculosis is carried out by a research bacteriologist assisted by an experienced technical staff. This has meant greatly increased precision, naturally, as regards diagnosis and treatment, and has brought about definite advances in our knowledge of the disease and its causative factor, the tubercle bacillus.

That this service is appreciated is shown by the constantly increasing demands made upon it, demands which it has become impossible to satisfy unless entirely new premises are erected.

7. The appointment of a staff of thirty-six distinguished honorary consultants, physicians, surgeons (general, thoracic, orthopædic), laryngologists, urologists, etc., who actively participate in the work of the Association and whose services and experience both in diagnosis and treatment are freely and readily placed at the disposal of the Association's Medical Officers.

8. In addition, with the object of securing the closest liaison between the research, scientific, and clinical sides of the work as well as of co-

ordinating undergraduate teaching with postgraduate practice, the Association, again through the munificence of the Llandinam family, has established a Chair of Tuberculosis in the Welsh National School of Medicine, the occupant of which not only acts as Professor of Tuberculosis in the University of Wales, but also as Director of Research and as a Consultant to the Association.

Moreover, the Principal Medical Officer holds the post of Honorary Lecturer and certain other members of the Memorial Staff are recognised clinical teachers in the Department, and take an active part in the instruction of undergraduates, and in the training of postgraduates for the special Diploma in Tuberculous Diseases originated by the University.

In this way keenness is fostered, a high standard of work maintained, and (what is very valuable) the Association is brought into close touch with the rising generation of practitioners.

The present annual maintenance cost of the scheme is roughly £260,000.

The total whole-time staff of the Association numbers about 1,040, made up as follows: Medical Staff, 52; Administrative, Technical and Clerical, 90; Nursing, 416; Teaching, 17; Domestic, 347; and Miscellaneous, 120. The Consulting Staff numbers 36.

In round figures the number of cases dealt with by the Association since its inception to December 31, 1936, is 263,000, of which 91,000 have been found to be tuberculous; of these 70,000 have received institutional treatment. In 1936 the number of new cases examined was 14,000; 3,000 of these were found to be tuberculous and 3,000 (new and old cases) were sent to institutions.

The Welsh National Memorial Association is unique in that it combines the advantages natural to a voluntary organisation with those inseparable from a State and rate-aided service. It has succeeded, through the vision and enthusiasm of its founders, in developing and assimilating in one organisation all those diversified activities that are essential to a live, comprehensive and efficient health-service—viz., research, teaching, educational propaganda, and scientific investigation, co-ordinated with clinical practice.

It may be claimed that its appeal is even wider; that it has united a nation, prone to division, in a crusade against a disease to which she is peculiarly vulnerable, and one, I am sorry to say, that has always taken the heaviest toll of her children.

TUBERCULOSIS ACTIVITIES IN CANADA

By R. J. COLLINS,
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Medical Superintendent St. John Tuberculosis Hospital.

I WELCOME this opportunity to thank our distinguished host, Sir Pendrill Varrier-Jones, and the Overseas League for their kind invitation to the members of the Canadian Tuberculosis Association to be present at this Conference, and from the latter I bring you greetings and their good wishes for the success of these meetings.

Some thirty members of the C.T.A. who came here in 1928 will never forget the splendid hospitality extended to them in England, Scotland, and Wales. You taught us many things of value to ourselves and to those we serve.

We were particularly interested in the centralisation of your activities in the control of tuberculosis under the National Department of Health. Canada, as you know, is a Dominion, consisting of a central government with certain defined powers, and self-governing provinces, extremely sensitive to their own rights. It is therefore obvious that, up to the present time, we do not have a centralised control of our health activities. Each province has built up its own Department of Health along somewhat dissimilar lines. They agree in their objectives but vary in administration.

There is a growing tendency to subdivide health activities into smaller administrative areas under the Ministry of Health. For example, New Brunswick, the first province with a Minister of Health, now has five sub-districts, manned by a D.P.H., who has also received training in the diagnosis of tuberculosis. This combined activity is possible because of the small population in each area.

Fortunately for the work in tuberculosis, the sanatoria preceded the organised units and have secured the lion's share of public funds.

Following our visit in 1928, we thoroughly discussed what appeared to be the most valuable work done in Great Britain. This fell under the headings of better housing, the stress laid on a more balanced diet as factors of improved resistance, numerous clinics for diagnosis and advice, splendid institutions for treatment, and the then experimental work in colonisation projects that today are established as a distinct advance in after-care.

The work in Canada has developed along parallel lines, with these differences: the importance our country has placed on a greater number of beds for treatment; the belief that the best results in treatment are

obtained by prolonged bed-rest; our failure materially to improve the housing of our population in crowded centres.

In 1928 our energies were spent in securing more beds for treatment. Today this situation is better. The province of Saskatchewan leads, I believe, with two beds per death; the other provinces are approaching that standard.

Unfortunately, the majority of our patients had advanced disease. To improve this situation various methods of education were stressed. It may be well to mention that the press, radio, and public meetings associated with the annual Christmas seal sale are very potent means for education in themselves.

In the last few years we have found it possible to establish more fixed clinics. They have always served as a stimulus to educate the public to recognise the early symptoms of tuberculosis, but a potent means of finding early disease in widely separated communities has been the employment of travelling diagnosticians who contact the general practioner.

The personnel of the fixed clinic endeavour to examine as many contacts as possible, and to discover the infector. Some of our clinics report a high average of these contacts examined for every positive sputum patient. The travelling officers follow this procedure but are hampered by lack of equipment.

Survey work has been followed for some time. It may be well to cite an example of this activity. I mention New Brunswick only because I have a more intimate knowledge of the work in that province.

The first survey work was attempted in 1925, introduced by the now able Secretary of the Canadian Tuberculosis Association, Dr. G. W. Wherritt. He examined and X-rayed the entire entering class in a local university. He found 3 per cent. with active tuberculosis. Since that time the work has expanded, until today the M.H.O.'s and the medical staff of the sanatoria are following this procedure in three universities, the Training School for Teachers, two orphans' homes (inclusive of those directly in contact with the children). A single survey has been completed on a large industrial group and the patients and staff of the Provincial Hospital for the Insane.

Associated with the above activities, county surveys were instituted. This effort is a combined one—education of the public in health by the use of lectures and moving pictures, and the examination of all who apply.

We soon found that the success of such a plan depended entirely on the completeness of the pre-survey work. The most successful area work brought some 3,000 people to the demonstrations and 600 for examination. We feel that more effective work will be done in the future with the intro-

duction of a complete Roentgen ray unit with power plant, moving picture projection apparatus and educational films installed in a motor lorry.

The combined efforts of the medical personnel of the sanatoria, the established clinics, and the tuberculosis officers are bringing more patients into the institutions with early disease.

Each province in its own way is trying to solve its problems in tuberculosis control. The methods of procedure are much the same, each stressing what it feels is most adaptable to the local situation.

British Columbia has recently correlated the entire tuberculosis programme and is doing splendid work. Alberta has a thorough-going plan of hospitalisation, fixed and travelling clinics.

Saskatchewan, with two beds per death, is well in the forefront of the problem of control. The special work among the Indian population is a fine piece of work.

The late Dr. D. A. Stewart, of Manitoba, has been a pathfinder in the control of tuberculosis, particularly his work in public health education.

Ontario, a more densely populated province, has many local units, consisting of a sanatorium, local and travelling clinics. Special work in silicosis has been carried on for years and is well known.

Quebec has gone forward rapidly during the last few years, and is increasing the number and bed capacity of its institutions.

The Maritime Provinces, with a higher death-rate, have well-established units and are doing a very creditable job.

It may be well to discuss what changes are occurring in the treatment of the increasing number of patients with minimal and early, moderately advanced tuberculosis.

I have already mentioned the use of prolonged bed-rest for early and active tuberculosis. This is still universally used, but the pressure on the institutions is bringing about a wider use of collapse therapy.

The use of artificial pneumothorax has markedly increased: some institutions report that 50 per cent of their patient population is receiving some form of collapse therapy. The problem presented is a difficult one for a scattered population, and we have found it necessary, at least in New Brunswick, to train some twenty general practitioners to continue the treatment in their local areas. As a result of this plan we are attempting to cut the period of sanatorium care to four months or less in those patients who are non-toxic and have sputum free of tubercle bacilli. A considerable number of patients may be handled in this way. Their after-care is supervised by the travelling diagnosticians and the sanatorium physicians.

We are not convinced of a high percentage of lasting results following phrenic interruption or section.

The early work in thoracic surgery in Canada was done by Dr. E. R. Archibald, and to him we are indebted for the introduction of extra-pleural thoracoplasty. As a result of his work thoracic surgery is done in every province, either in the sanatoria or in a general hospital. The former plan seems the most suitable.

Of the chronic, economically impossible patients some 70 per cent. are rendered sputum-free of tubercle bacilli and 60 per cent. are capable of earning their livelihood. The mortality is very low, less than 8 per cent. However, extra-pleural thoracoplasty has a reasonably limited field.

Our attitude is changing in regard to treatment of the so-called childhood type of tuberculosis. Constant examinations bring to light a great many. Experience is teaching us that the symptom-free child requires little active care. They are therefore examined at intervals for further progress. A plan of contacting these children at or near puberty and the introduction of repeated examinations from that period into early adulthood is being tried out in one area.

At present the results of treatment are roughly: death in institutions of 10 to 15 per cent., controlled disease by various surgical measures in 25 to 30 per cent., 15 per cent. chronic invalids with extensive bilateral disease with no economic future and who will probably die within a five-year period. This latter group constitute a serious problem. They require isolation and some care. We are convinced that less care must be provided. We are left with a considerable number of patients who fall in the group with quiescent disease, who may break down at a later date. These people require intelligent consideration.

Dr. Wodehouse has already told you that Canada has little to offer in after-care projects. During the years of depression we obtained little sympathy from local authorities or from the public. The very logical idea was prevalent that inasmuch as a considerable proportion of our healthy population were receiving State aid, why should special dispensation be made for the physically handicapped? However, we can report that this group is not entirely neglected.

The employment of ex-patients in sanatoria varies from 2 to 33 per cent. of the total employed personnel. Some of the institutions are outstanding in that they have found it feasible to employ such people. They report that their experience has been satisfactory and that the ex-patient better understands the problems of the institution, is more loyal and willing to serve. The employed individuals are physicians, nurses, maids, orderlies.

I have a recent report of the Vancouver Occupational Industries, a voluntary organisation, affiliated with the Division of Tuberculosis Control. They provide occupation for a limited number of convalescent patients. One feels that this work has been properly conceived and will in all probability benefit a number of invalids.

I will now quote the data collected by Dr. R. G. Ferguson on the results of sanatorium treatment between the year 1928 and September 1, 1934.

There were 3,569 civilian patients discharged alive from the Saskatchewan sanatoria:

Total living on September 1, 1934	2,745
Died	824

Of the 2,745 still living:

Not heard from	166
Unable to work	372
Working	2,207

Of the last group 1,969 were adults:

1,773, or 90·04 per cent., are working.
171, or 8·68 per cent., are not working.
20, or 1·01 per cent., not working because of non-tuberculous disease.
5, or 0·25 per cent., occupation unknown.

We must remember that Saskatchewan is not an industrialised province. We must assume that the majority of their discharged patients are following agricultural occupations. Therefore we may sum up the after-care problem in Canada as follows: approximately 10 per cent. of our discharged living patients are unable to work, 23 per cent. are dead, and we can only assume that a certain proportion of these patients would have been salvaged if proper employment had been provided.

Basing our estimate on a death-rate of 60 per 100,000, an incidence-rate of active disease five times this figure, we should have a minimum of 3,300 discharged patients who would probably be benefited by sheltered employment.

We welcome this Conference for a renewed interest in the ever-present problem of after-care. We go away stimulated to do a better job of rehabilitating the wreckage of tuberculosis.

SOME PROBLEMS IN SURGICAL TUBERCULOSIS

By Sir HENRY GAUVAIN,
M.D., M.CHIR., F.R.C.S.
Medical Superintendent, Lord Mayor Treloar Cripples Hospital, Alton.

In the vast proportion of cases conservative treatment is the treatment of choice in surgical tuberculosis.

Conservative treatment is defined as the adoption of measures which tend to improve the patient's health, increase his powers of resistance to tuberculous disease, and preserve or restore the part, or various parts, attacked.

In a limited number of cases radical treatment is preferable, as, for example, in most cases of tuberculous disease of the knee-joint in an adult, where incision of the knee is very frequently indicated, both because duration of treatment is thereby shortened and danger of recurrence is largely avoided, but also because the resulting disability is comparatively trifling and indeed often less than if protracted conservative treatment were employed.

It may also be desirable in small tuberculous foci which can be readily and completely removed. Excluding these somewhat limited types of cases calling imperatively for radical measures, in the majority of cases conservative treatment is the treatment of choice.

Consider, first, tuberculous disease of the spine and hip.

There is much controversy as to when the treatment may be aided by operations not directed to remove the site of the disease but intended to fix it. In the author's experience such operations are not as a rule indicated during active and progressive disease, especially in the presence of deformity, as deformity can almost always be reduced or corrected during treatment. Fixation prevents this remedial measure being undertaken. When the disease is arrested in tuberculous disease of the spine, properly fitting appliances are often all that is required, but in cases of debilitated patients and those with poor musculature osteosynthesis is indicated, as otherwise deformity is likely to occur gradually and progressively increase. By fusing or otherwise fixing the spine this sequel is prevented, but such an operation is not called for except in cases where it is specially indicated.

In tuberculous disease of the hip, fixation operations are also not advocated until arrest of the disease. In some cases the lesion would be healed

and the joint will recover an almost full if not completely full range of movement. In the majority of cases fibrous ankylosis occurs. These may be treated in the first instance by splinting, but if in spite of splinting there is a tendency to adduction deformity then arthrodesis is called for, or if deformity has occurred arthrodesis combined with one or other form of osteotomy is the treatment of choice.

Much controversy has recently arisen as to the correct treatment of tuberculous glands of the neck. Some schools are for avoiding operation, others are equally insistent that operation should always be undertaken.

In practice, the course I adopt varies considerably with the type of case treated. In an exceptional case of there being only one large gland, full of pus, simple aspiration suffices. In the majority of cases a preliminary period of conservative treatment is indicated. The neck is immobilised by the application of a suitable carapace, and general measures to improve the patient's health are adopted. Great care should be taken in the application of light. Excessive dosage more often inflames the glands affected and causes pus formation than otherwise. This may be deliberately planned, in some cases with admirable results, and in such cases usually the insertion of a seton will cause the glands to empty themselves and disappear. If, after a preliminary period of treatment, hard glands remain which are not likely to absorb, then these should be most carefully excised. This operation should be undertaken with skill and care to avoid subsequent scarring or other complications. Glands which are on the point of breaking down should generally be emptied before operative treatment is commenced, as there is great danger of sinus formation ensuing.

In spite of most careful operative treatment and apparently complete excision of glands, in a certain number of cases glands will recur at the site of operation, and then nearly always recur very speedily. Again, conservative treatment should be undertaken before their excision is attempted.

In tuberculous disease of the abdominal glands conservative treatment is always the method of choice. Operations should be avoided whenever possible. Such cases are almost always associated with colitis and sometimes with intestinal ulceration. The necessity for careful dieting and avoidance of roughage in the food should always be borne in mind, and the much-debated test, the Triboulet Test, on which very contrary opinions have been expressed, should nevertheless be employed as a useful guide to the condition of the large intestine.

These remarks are intended rather to stimulate discussion than to cover all the many problems which confront the surgeon dealing with so-called surgical tuberculous conditions. They are provocative rather than dogmatic.

AFTER-CARE OF THE TUBERCULOUS IN AUSTRALIA

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The questions of the care and the after-care of pulmonary tuberculosis—and most of my remarks will refer to pulmonary tuberculosis—are very closely interwoven with us; indeed, owing to the protracted nature of the convalescence or the recuperative period from tuberculosis it is difficult for us to indicate that point of time where care ceases and after-care commences. We have not the same facilities for after-care as obtain in this country. Although we have a village settlement, based in principle upon your own excellent Papworth Scheme, it is as yet in embryo, and has a long way to go before it will be functioning to any material extent. After-care, with us, concerns itself more with social work amongst the tuberculous and amongst their dependents. Our after-care committees concern themselves with patients only after their discharge from institutions, but they do render material assistance to the dependents of necessitous patients whilst they are in institutions and afterwards.

The disease of pulmonary tuberculosis in Australia is not such a serious one as it is in many parts of Europe. Fortunately our climate is a very beneficent one, and even so far as climate is concerned there are differences to be noted between the effects of climate upon the pulmonary disease in Australia from those seen in Europe. Here, for instance, the severe winter constitutes a threat to those suffering from respiratory disease. With us it is different: the winter is mild, and it is the hot, humid summer, particularly in the coastal region, which constitutes the threat to our tuberculous patients—in fact, it is always considered advisable for those suffering from tuberculosis to get away from the humid regions during certain months of the year. Consequently, most of our sanatoria are situated at least some distance inland, some distance away from the coast.

A further difference that I would point out is that our large cities—and we have two of them—whilst they contain aggregations of over 1,000,000 people, are not very congested.

Although tuberculosis exists for the most part in our cities, and to a very much less extent in our rural areas, yet the total amount of disease is not high. In the year 1935 the death-rate from pulmonary tuberculosis

in my own State was only 35 per 100,000—350 per million. Ten years ago the figure was at 44, in 1875 the figure was 114. There has been a steady decrease in the death-rate during those years, with small peaks in between, and our impression is that the death-rate is falling very rapidly still.

So far as pulmonary disease in children is concerned, it is almost non-existent, although we have a fair amount of glandular tuberculosis, particularly in the city areas. The impression of both Australian surgeons and Australian physicians is that the conservative treatment of glandular tuberculosis is the best form of treatment, at least in our country.

So far as the actual treatment of pulmonary tuberculosis is concerned, the State, the central governing body, plays a very important part throughout the whole Commonwealth. We have, as you know, a Federal Government, there is a Central Commonwealth Government, and each State also has its own Government. There is a Department of Health both in Federal circles and in State circles, and although the Federal Minister for Health has very little in the way of executive power with regard to disease and its prevention, except in quarantine circles, yet I am pleased to say that the happiest co-operation and unanimity exist between Federal and State health centres, largely, I think, owing to the happy personnel who occupy the important positions, so that we have no difficulty whatever in obtaining co-operation between Federal and State Governments, and any suggestion made from the Federal Government is given the most earnest attention by our State Health Department. Only, for instance, in 1925 a Commission on Health was conducted in Australia by the Federal Government, from which certain suggestions emanated, and although the Federal Government had no more power than the man in the moon to enforce those suggestions, yet I am pleased to say that the bulk of them have been carried out, or some attempt has been made to carry out the bulk of them.

In each State there is a Director-General of Health, a public health officer who works under the Minister for Health; but apart from that, health has a subdivision in the principal States known as the Tuberculosis Division, and the Tuberculosis Division is administered by a Director of Tuberculosis, also a public health officer. In my own State, the State of New South Wales, there is what is known as a Board of Control, which has been in operation for ten years. This Board of Control co-ordinates the activities of all the bodies interested in tuberculosis. The function of the Board of Control is for the most part advisory. I do not wish to convey the impression by the word " control " that this Board has any executive powers; it is purely an advisory body. It consists of members representing the metropolitan hospitals, the sanatoria, the Government. The Director-General of Health is its chairman, and the Director of Tubercu-

losis is its convener. This Board meets from time to time and offers advice. There is no difficulty in having the advice followed because the Director-General of Health is the chairman and the Director of Tuberculosis is a member of the Board, and provided that finance is available for carrying out any recommendations made by this Board they are most surely put into effect.

The Director of Tuberculosis and the Board of Control between them control the admissions to all our institutions, and they control the policy of those institutions as regards the sanatoria. For instance, the Board of Control has determined that certain sanatoria in certain districts are more suitable for early cases of tuberculosis, admissions to those institutions are accordingly restricted to early cases. Similarly, other institutions are set apart as being more suitable for advanced cases, and so on.

The same body attends to the question of propaganda and educating the public, and in this connection full use is made of the public press, the system of distributing information by leaflets, and by broadcasting by the radio.

The object of the Board of Control is that each patient, on notification that he is infected with tuberculosis, shall be kept in touch with for the rest of his days. At the Central Bureau there is, of course, a card-index system containing all particulars about the patient, the institution to which he goes and his address after his discharge. He is kept in touch with, he is advised to report to such and such a dispensary, and his contacts are rounded up and examined. Financial assistance or, rather, material assistance in the way of food and clothing is provided if necessary, and so on; so that from that point of view you see that the scheme is in conception an ideal one. Unfortunately, in operation it falls short of the ideal to which I have referred, for reasons to which I will refer later on.

In every State of the Commonwealth notification of tuberculosis is compulsory, and although notifications are made to municipal bodies, the fact of the notification and the detailed information contained in it eventually finds its way to the Director-General of Health and from him to the Director of Tuberculosis and the Board of Control, so that all the information of the municipal authorities becomes available at central headquarters. The importance of this will be realised when I tell you that we have also in our State a public school medical officer system whereby public medical officers inspect the public schools. It becomes quite a simple matter of administration, therefore, for the public school medical officer to be informed of any contacts of tuberculous people who happen to be within his district, and he can keep an eye on them throughout the whole of their schooling. I need hardly say that contacts are all examined both radio-

logically and by skin tests, and should there be found any necessity to give them treatment, such treatment is forthcoming. Should they be undernourished or poorly clothed or in need of any material assistance, there are special facilities for granting such assistance; so that from that point of view I think our scheme works out very well. A great deal is being done, largely owing to the activities of the State; but a great deal, I think, remains to be done still. I feel that for various reasons, no matter how efficient the schemes for the prevention and the control of tuberculosis conceived by our States, they must fall short of their ideal and their objective unless two things have also been perfected. The first of these two things is the necessity for compelling patients to undergo adequate treatment. Now even if all cases are notified—we will take the poorer classes first, the working classes—even granting that every patient who is a working man suffering from tuberculosis is known to the central authority, it still remains for that patient to decide whether or not he will undergo treatment. The State is paralysed. If the man says, "I cannot undergo treatment, I must remain at work, I must support my family," then what is the good of all our public health measures? With us we have very little difficulty in persuading our patients of the need for treatment, but it is quite a different matter for all of them to render themselves available for treatment. The necessity to provide for his dependents very often leads a working man with us to sacrifice his own life, and in doing so to compromise possibly the lives of others. Friendly societies, semi-public bodies, the Red Cross Society, and the Government itself do a great deal to mitigate this evil by providing food, clothing, and extra necessities for dependents, but that is not sufficient: the only adequate reply to this difficulty is financial assistance, and until financial assistance is available for this type of man in sufficient amount to provide decently (as he would consider) for his people, a certain definite proportion of working men will not give up work and will keep going almost to the last gasp, knowing all the time that they are doing themselves harm, knowing all the time that they are making a sacrifice.

A man who is undergoing treatment in Australia for tuberculosis which has been considered due to his war service receives a pension of £4 a week, and his dependents—his wife and children—get a proportionate increase over that. The single man would get £4 a week, a married man with children a correspondingly greater amount; and here is another thing: any man suffering from pulmonary tuberculosis in Australia which might be considered due to his war service receives a pension of £2 a week for life, whether he is fit for work or not. I am not going to say that that is a wise measure; I am not going to say that that is not perhaps an example of the unwisdom of parliamentary interference in scientific matters. Neverthe-

less, it is a fact, and as a result of that the returned soldier tuberculous patient, I think, fares very much better than the civilian tuberculous patient, and that I quote as an example of the fact that financial assistance is the best way of coping with this difficulty of the working man who will not give up because he wishes to look after his family. The provision of food and the provision of clothing are not enough.

The well-to-do patient is not easily disciplined; he is not readily amenable to institutional treatment. He frequently thinks that he can do better by living privately in what he would consider a healthy area, and he constitutes, I consider, a menace which is even greater than that of the working man who continues at his work. Even if all these patients were notified, even if the Public Health Office knew where every well-to-do patient suffering from tuberculosis was, it would not be sufficient merely to file that information unless the Public Health Office could satisfy itself that adequate treatment was being given; and the suggestion I would make is that the Public Health Office should be empowered to insist upon adequate treatment being given in the case of all notified patients. That means to say, that in the case of the well-to-do the Public Health Officer should have the opportunity of consulting with the doctor and of satisfying himself that no one was being endangered by the type of treatment which was being carried out, either the patient or those around him.

Finally, returning to this question of notification, we have very wisely devoted a great deal of time and expenditure to the education of the public on public health matters. We inform them of the dangers of pulmonary tuberculosis, of the necessity for early, prolonged, and efficient treatment, and we have done well in doing so; but I think the time has come when we should put our own house in order and should conduct propaganda among the members of our own profession in order to make them realise in full the detailed reasons of the necessity for notification and for early treatment.

I think that I have more or less covered the ground as I see it. I should like to say that I envy you very much indeed your Papworth Village Scheme. We hope to have something of that type going some day. The village settlement, as I have said, has been formed, and it is only a question now of getting adequate financial support, and it will commence to function quite well. We hope, particularly, to have this village settlement going soon, because the question of the provision of work for the rehabilitated case is a difficult one. In Australia, with a large proportion of working men, outdoor work is mostly laborious and it is not the most suitable work for the rehabilitated tuberculous case, and one finds in our cities particularly that our rehabilitated cases are more or less compelled to follow sedentary

and often indoor occupations because that is all they are strong enough to do; they are not strong enough to work with their hands in the open, especially in a climate that is very hot in the summer-time. It is a pity, in a way, that the nation could not be reorganised as the army was in war time, when A, B, and C class men were given A, B, and C class jobs, and C3 jobs could not be filled by A class men. If we could have some such type of organisation in our civil life there would be more opportunities for the rehabilitated tuberculous patients. But it is a very serious difficulty to know what to do with them, and the advice to give them with regard to occupation after they have been cured or set upon their feet, and that is why I look forward to the days when the village settlement scheme will be in full operation.

THE FUNCTION OF THE HOSPITAL IN THE TUBERCULOSIS PROBLEM

By L. S. T. BURRELL,
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Physician to the Royal Free Hospital and to the Brompton Hospital for Consumption and Diseases of the Chest, and to the King Edward VII. Sanatorium, Midhurst.

When the body becomes infected with tuberculosis, the effect varies according to the size of the infection and the resistance of the individual. A massive dose may lead to death from a generalised tuberculosis in a few months or even weeks, whereas a small one may be overcome without leaving a scar and often without producing any feeling of ill-health. The majority of people in civilised countries are infected at some time during their lives without knowing it, but with these we are not now concerned, for it is only when the disease is sufficient to produce symptoms that the patient seeks advice. When tuberculosis is recognised either as a primary or a re-infection the object of treatment is to make the lesion heal without spreading, and it is in this stage that the hospital is valuable. Here the patient can have good nursing, the requisite amount of rest, supervision with X-ray, blood examination, special treatment such as artificial pneumothorax, and here he should remain until he is fit to be up for at least six hours a day. When he is better, treatment in a sanatorium, which is to tuberculosis what a convalescent home is to typhoid fever, is best. It is impossible to over-state the value of this initial period of rest in cases of pulmonary tuberculosis. Modern surgery has done and is doing marvels, and often drags from the very brink of the

grave patients with advanced disease in the lung; but let us not forget that the duty of the physician is to prevent the patient from getting into that stage of the disease when such drastic measures become necessary. A patient will often say that he is not bad enough for bed, and will try to compromise by offering to give up a certain amount of work and go into the country. He often adds that bed is weakening, which is true, just as rest of a limb by splinting is weakening to its muscles. But rest of a limb is essential if the joint is tuberculous, and so is rest of the lungs if they are affected. They may be rested by keeping the patient in bed, and if this is not sufficient some form of collapse treatment can be added. When the activity of the tuberculosis has been arrested, the weakened body can be strengthened by gentle exercise gradually increased—that is to say, by sanatorium treatment.

Hospital treatment plays a part in the final as well as in the initial stages of the disease. When the patient with advanced disease can do little or nothing for himself he should be in a hospital with nurses trained to look after him, not only for his own comfort but to prevent infection to others. One other function of the hospital must be mentioned, and that is as a centre for diagnosis. Tuberculosis is often suspected as the cause of some ill-health, and in doubtful cases the best procedure is to keep the patient under supervision in hospital for a week or two. Here the temperature can be observed with the patient at rest and after exercise. The sputum and blood can be examined. Radiographs can be taken and tuberculin tests made.

Whether the hospital is actually in the grounds of some sanatorium or an institution apart seems to me a matter of small importance, but I have always regarded it unwise to have patients with advanced disease on balconies in view of those in the earlier stages who have every hope of recovery. To encourage these it seems more important to employ as gardeners, porters, etc., ex-patients who have recovered, so that the patients may have before them examples of success and not of failure.

At the Brompton Hospital there are 368 beds, and patients with intra-thoracic disease other than tuberculosis are admitted; but the great majority are cases of pulmonary tuberculosis. A large number come merely for diagnosis, after which they are sent home or to some convalescent home if non-tuberculous, but otherwise are drafted to a sanatorium or institution suitable for the stage of the disease. In connection with the hospital is a sanatorium at Frimley, which has 150 beds and is in Surrey, some thirty miles from London. The hospital may be regarded as a diagnosis centre and sorting clinic. In addition a number of patients have treatment in order to prepare them for the convalescent or training routine of the

sanatorium. Apart from rest in bed, rest of the diseased part is obtained in a number of cases by artificial pneumothorax and such surgical procedures as thoracoplasty and phrenic nerve paralysis. The surgical side of the hospital has grown enormously, and whereas there were 70 operations performed at the hospital in 1919 there were 985 in 1936.

In addition there is an out-patient department and dispensary. Here patients are kept under supervision by regular clinical and radiological examinations, so that any return of activity can be quickly detected and treated. Artificial pneumothorax refills are given and average 230 a week in the out-patient department.

There are X-ray, pathological, throat, nose and ear, and dental departments, and in 1936 16,800 X-rays were taken compared to 1,200 in 1919.

There is also a large social department under the lady almoner, so that patients can receive help, and through this department most important work, such as boarding out children from an infected household, is arranged.

The function of the hospital is quite different from that of the sanatorium, which again differs from that of the colony, but all play their part in helping to control one of the greatest scourges of mankind.

FOURTH SESSION

CHAIRMAN: THE RT. HON. THE LORD ALLEN OF HURTWOOD

THE FIGHT AGAINST TUBERCULOSIS IN SCOTLAND

BY ERNEST WATT,
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Statistical Introduction.*

A BRIEF preliminary survey of the principal vital statistical features of tuberculosis mortality will give us some indication as to the progress made in recent years and the present position. In Scotland, as in most other countries, rates of mortality from tuberculosis have, with little interruption—*e.g.*, as during the war—shown an extremely favourable trend for many years past. The rate of decline, in fact, is much greater than that of all other causes together, and surpassed that for most individual causes except some of the principal acute infectious diseases (smallpox, typhus, etc.). In 1861-65 tuberculosis accounted for approximately 16 per cent. of all deaths, whereas in 1931-33 only 6·3 per cent. were debited to this cause. If the two quinquennia 1871-75 and 1931-35 are compared, the tuberculosis death-rate shows a decline of 78 per cent., whereas mortality from all other causes shows only 35 per cent. decline. This method of comparison, of course, fails to take account of the effect on rates of mortality of changes in the age-distribution of the population at risk. Even when these are eliminated from the comparison, however, tuberculosis still shows the greater degree of improvement. In Table I. the more recent experience of Scotland is shown for the years 1911-33. In the quinquennium preceding the war, tuberculosis accounted for 10·8 per cent. of all deaths, and in each succeeding group of years this proportion has steadily improved. Mortality from all forms of tuberculosis since 1911 has declined by 50 per cent., pulmonary forms by 45 per cent. and other forms by 61 per cent., whereas general mortality has shown an improvement of only 11 per cent.

* For valuable assistance in the preparation of this introduction I am indebted to Dr. P. L. McKinlay, Department of Health for Scotland.

TABLE I.

DEATH-RATES FROM TUBERCULOSIS IN SCOTLAND, 1911-15 TO 1931-33.

Period.	*Deaths from Tuberculosis (All Forms) Per Cent. of Deaths from All Causes.*	*Death-Rate per 100,000.*			
		Tuberculosis.			*All Causes Other than Tuberculosis.*
		All Forms.	*Pulmonary.*	*Other Forms.*	
1911-15	10·8	169	110	59	1,399
1916-20	9·8	147	99	48	1,354
1921-25	8·4	117	81	36	1,269
1926-30	7·1	96	68	28	1,267
1931-33	6·3	84	61	23	1,249

The age-distribution of tuberculosis mortality and the amount of improvement at individual ages and in the sexes will be evident from Table II., in which are shown the mortalities separately for pulmonary and other forms of tuberculosis in 1911-13 and 1931-33 in broad age-groups, together with the percentage decline between these years. In general, the greatest reduction has occurred in mortality in the earliest years of life.

TABLE II.

DEATH-RATES PER 100,000 FROM PULMONARY AND OTHER FORMS OF TUBERCULOSIS IN SCOTLAND BY SEX AND BROAD AGE-GROUPS, 1911-13 AND 1931-33 WITH PERCENTAGE DECLINE.

Ages.	*Pulmonary Tuberculosis.*						*Other Forms of Tuberculosis.*					
	Males.		*Females.*		*Per Cent. Decline.*		*Males.*		*Females.*		*Per Cent. Decline.*	
	1911-3	1931-3	1911-3	1931-3	*M.*	*F.*	1911-3	1931-3	1911-3	1931-3	*M.*	*F.*
0 –	29·6	12·2	26·0	13·7	58·8	47·3	306·8	100·8	239·9	83·0	67·2	65·4
5 –	20·6	6·6	39·7	14·3	68·0	64·0	57·1	25·3	62·4	23·2	55·7	62·8
15 –	160·3	94·5	166·1	88·8	41·1	46·5	28·8	17·5	29·2	15·8	39·3	45·9
45 –	184·2	101·3	103·3	43·3	45·0	58·1	21·2	10·3	18·9	8·8	51·4	53·4
65 –	84·6	47·6	41·6	23·0	43·7	44·7	16·8	10·3	16·6	11·3	38·7	31·9
All ages	114·8	68·3	107·5	55·1	40·5	48·8	65·6	24·9	56·3	20·9	62·1	62·9

Table III. shows the rate of mortality separately for pulmonary and other forms in the four regions of Scotland for the same two triennia with the

percentage reduction therein. These rates have been standardised to eliminate differences in the age and sex constitutions of the population in these regions—a necessary feature, especially as regards the non-pulmonary mortality. It will be noted that in each of these triennia the heaviest mortality from tuberculosis is found in the West Central part of Scotland, the lowest in the Border group of counties, with the East Central and Highlands and Islands showing intermediate rates. The amount of decline is lowest in the Highlands and Islands, greatest in the Borders, with the Industrial Belt occupying an intermediate position; but the differences in the rate of decline in regions are not very striking. The geography of non-pulmonary tuberculosis shows distinct differences. The heaviest rate pre-war was in the Industrial Belt, particularly in the western area, with the lowest rates of all in the Highlands and Islands. In 1931-33, however, the rates of mortality in regions approximate more closely to one another, the lowest rate being actually found in the eastern part of the Industrial Belt, the rates for the three remaining regions approximating closely. The reduction in mortality for this period of twenty years is obviously much greater in both parts of the Central district of Scotland and lowest of all in the Highlands and Islands. Clearly the change in geography of non-pulmonary differs markedly from that of pulmonary tuberculosis in Scotland, and will be referred to in greater detail in discussing the effect of the milk supply on mortality from non-pulmonary tuberculosis.

TABLE III.

STANDARDISED DEATH-RATES PER 100,000 FROM PULMONARY AND OTHER FORMS OF TUBERCULOSIS IN THE REGIONS OF SCOTLAND IN 1911-13 AND 1931-33, WITH THE PERCENTAGE-RATE OF DECLINE.

	Pulmonary Tuberculosis.			*Other Forms of Tuberculosis.*		
	1911-13.	1931-33.	*Per Cent. Decline.*	1911-13.	1931-33.	*Per Cent. Decline.*
Highlands and Islands ..	111·4	63·8	42·7	41·4	23·1	44·1
West Central	117·7	67·0	43·1	68·4	24·9	63·5
East Central	103·3	54·5	47·2	55·8	19·3	65·3
Borders	99·8	48·5	51·4	48·9	23·3	52·0

This scrutiny of the figures for Scotland gives much room for hope, but the present general level of mortality from this disease, and the fairly wide geographical age and sex variations, indicate the effect of specific and local causes which are still operative and the removal of which must be one of the objects of any further advance.

The Campaign in Scotland.

Historical.—A useful method of forecasting future developments would be to sharpen our wits against a consideration of the campaign, as it has so far been conducted in Scotland. Although at its most southerly point Scotland is a mere matter of 400 miles south of the latitude of Cape Farewell (60° N. Lat.) and one county is north of this line, it has a remarkably equable climate and possesses excellent water supplies and other amenities that make life worth while. Study of an orographical and a population map[1] will show that roughly three-quarters of the population in the " midland valley " of Scotland are found on an acreage not quite one-fifth of the area of Scotland. Most of the mineral, etc., wealth being within this area, it can readily be understood how, during the early and middle decades of last century, much ill-planned housing existed.

For details of the unsatisfactory conditions under which a considerable part of the population of Scotland was and still is housed, and for an expression of opinion as to the effects of housing upon tuberculosis, I would refer the interested reader to the pages of the *Report of the Royal Commission on the Housing of the Industrial Population in Scotland, Rural and Urban*[2], and *The Health of Glasgow.*[3]

In 1887, under the direction of Sir Robert Philip, a new era of hopefulness was born. In that year what has come to be known as the Edinburgh scheme was inaugurated. In an official Report[4] dated 1908 we are informed that prior to 1888 cases of tuberculosis, both medical and surgical, formed a large part of the total number of cases treated in the various hospitals of the country, and that the indoor and outdoor departments of the hospitals were largely blocked by these cases: and that prior to 1887 no procedure had been undertaken, based on the recognition of tuberculosis as an infective condition. The Edinburgh scheme is so well known that I need not refer to it in detail. It has had both national and international repercussions in stimulating the attack on the disease.

To glean some detail as to what was being accomplished about this time and in subsequent years in Scotland in the form of institutional care of tuberculous patients, reference may be made to the reports[5] of the Local Government Board. In that for 1899 we read that in certain poor-houses, while special provision is made for cases of phthisis, the " incipient " and the " advanced " cases are " mixed " in the same ward. This, it was found, caused the incipient or favourable case to leave the institution before any benefit had accrued. In the report for 1903 it was pointed out that in several poor-houses isolation and special treatment were available, and in two such instances open-air shelters were available in the grounds of the institution.

By 1905 further advance in this direction is referred to. Thus in one large institution special open-air chalets were available. It was found that whereas male patients eagerly took advantage of this accommodation, the females were more reluctant to sleep under these open-air conditions.

In a special report to the Local Government Board[6] the late Sir Leslie Mackenzie, in his introductory note, remarks: "Another outstanding conclusion (from the investigation) is that the voluntary agencies, great and admirable though their work has been and is, cannot cope with the demands on their organisations. . . . The facts recorded are a reflection upon the vigorous and multiform activities both of the Poor Law authorities and of the Public Health Authority of Glasgow." It is recorded in this report that during the seven years 1904-10, 5,908 cases were admitted to these poor-law institutions, and that over a third of them died therein. I refer to this in exemplification of the potential amount of segregation of the advanced type of case achieved during these years.

Contemporaneously work of a similar quality was being carried on elsewhere. Not only as a matter of "history," but particularly in respect of the value of the conclusions based upon intensive field research into the disease in a burghal and a county area at that time, I would refer the interested reader to the Annual Report for 1909 by the Medical Officer of Health, Aberdeen, the late Professor Matthew Hay, and a special report on tuberculosis, 1913, by the late Dr. John T. Wilson, County Medical Officer, Lanarkshire.

Notification of Tuberculosis.

On August 1, 1912, compulsory notification of pulmonary tuberculosis took effect, and on July 1, 1914, this was extended to all forms of the disease.

Table IV. shows the number of pulmonary and other forms of tuberculosis notified in Scotland in quinquennial periods since 1914 and during the years 1934 and 1935.

TABLE IV.

NUMBER OF TUBERCULOSIS CASES NOTIFIED IN SCOTLAND IN QUINQUENNIAL PERIODS SINCE 1914, AND FOR THE YEARS 1934 AND 1935.

Years.	*Pulmonary Cases.*	*Yearly Average.*	*Non-Pulmonary Cases.*	*Yearly Average.*
1914-18	43,677	8,735	23,168	4,792
1919-23	38,533	7,706	22,425	4,485
1924-28	33,046	6,609	23,757	4,751
1929-33	28,267	5,653	19,642	3,928
1934	—	4,985	—	3,066
1935	—	4,939	—	2,951

Number of Cases on the Live Registers.—Since 1925 Medical Officers of Health have sent to the Department of Health a statement of the number of cases of tuberculosis on the live registers at the end of each year. An examination of the returns shows an increase in the number of pulmonary cases known to have positive sputum from 6,561 in 1925 to 8,199 in 1935. This is a reflection of more intense bacteriological investigation into these cases. Probably today the figure is more exact than in 1925. Many of these cases are held in sanatoria, but the chronic " carrier " type is capable, if hygienic standards are relaxed, of passing on the infection in " massive " doses. The time will come when, as happened with the typhoid carrier, intensive search will be made for the infecting source of each new victim of tuberculosis. The arrival of this era will be advanced according to the speed with which we gain and preserve control of " loose " sources of massive infection.

The disease in its non-pulmonary forms, especially gland and abdominal cases, shows substantial reductions. Thus the number of superficial gland cases on the registers dropped from 7,284 in 1926 to 4,798 in 1935. The corresponding figures for abdominal cases were 3,491 and 2,255. This, and the substantial drop in the death-rate to which reference has been made on page 184, is attributable in no small degree to our better control over the milk supply of the country. This has been achieved partly by means of pasteurisation (especially in the industrial populous areas), partly by clearing up of the dairy herds. The number of licensed tubercle-free herds in Scotland is now 528, with 20,400 milk cows, yielding 14,182,000 gallons per annum.

Research.—My remarks under this head will be limited to a consideration of certain investigations that have been carried out in Scotland in connection with the relative proportions of the disease due to the human and bovine type of organism.

It has been stated[7] that the incidence of bovine infection is higher in Scotland than in England. Whether this contention will stand the test of time is beside the point. But in an investigation into 269 children under fourteen years of age[8], in over 31 per cent. the bovine type bacillus was found to be responsible for the disease—respiratory, abdominal and cervical gland cases. In investigations[9] over a number of years into pulmonary cases, the Superintendent of Glenlomond sanatorium reports that out of 952 cases of pulmonary tuberculosis, in 46, or 4·8 per cent., the organism was of bovine type.

Institutional Provision.—The crusade against tuberculosis received an impetus from the National Insurance Act, 1911. This Act made provision for a capital grant to local authorities towards the cost of erection of sanatoria and treatment of patients. Encouraged by this and a realisation

of their responsibilities, local authorities or combinations of them submitted schemes for approval, and, although there was delay, due to the Great War, in carrying these out, by 1921 the total number of beds approved for tuberculosis was 3,558 in 103 sanatoria, hospitals and other institutions. At present the " beds " in institutions now approximate 5,500, or roughly 1 bed per 900 of the population, a figure well in advance of that recommended by the Astor Committee.[10] There are now sixteen residential institutions each with 100 or more beds, eleven containing between 50 and 99 beds, fifty-four under 50-bed capacity, and forty-one, mostly voluntary institutions, where the accommodation for tuberculosis is not specified as to number. Even with this number of available beds the " waiting list " is not an unusual occurrence.

In the smaller units the quality of the accommodation has not advanced *pari passu* with the advance in standards which has taken place throughout the years. This defect is referred to in the conclusions and recommendations of the Scottish Health Services Report[11] (p. 206): " Institutional accommodation for tuberculosis should be overhauled with the object of securing the provision of regional institutions for the modern treatment of pulmonary and other forms of tuberculosis from which all treatment over wide areas should be supervised." The idea underlying this recommendation is a realisation that it is neither expedient, nor indeed possible, to equip—expert staff as well as material equipment—the smaller institutions in order to keep abreast of treatment in the most comprehensive interpretation of the word.

Since 1925 the percentage of pulmonary deaths occurring in institutions to the total deaths from this cause has been steadily increasing. Thus the averages of those dying in institutions for the quinquennium 1925-29 was 35 per cent. for males and 29 per cent. for females. In 1935 the corresponding percentages were 47 and 39.

Work Colonies.—About thirty years ago, under the auspices of the Royal Victoria Hospital Trust, a small colony of some 12 beds was established. During recent years this institution has been run as part of the City of Edinburgh tuberculosis scheme.

In 1923 industrial workshops were established at Hairmyres sanatorium (Lanarkshire). This differed from the village settlement idea in that the trainees left the institution at the end of their period of training. The men were given training in motor repairing, all kinds of cabinet making, basket making, boot repairing (machine and hand), under qualified instructors, and then were encouraged to go forward to the examinations held by the City and Guilds of London Institute. Year by year trainees have gained these certificates. It should be mentioned that patients have been admitted to Hairmyres from areas in Scotland other than Lanarkshire.

The Dispensary Unit.—The number of dispensaries—known in some areas as health institutes—is 42. Many of these are used jointly for child welfare, antenatal clinics, treatment of minor defects in school-children, etc. This has been accomplished as the design and equipment of the newer units were improved. To quote again from the Health Services Report[12]: "The dispensary and clinic work on tuberculosis should be developed in close association with that on allied branches of medicine."

Home Visitation.—From the remarks already made it can readily be deduced that in the greater area (geographical) of Scotland, it has not been considered necessary or expedient to develop the dispensary unit along lines adopted in the more densely populated regions. In these rural areas the tuberculosis officers have given the equivalent service by visits to the homes of the patients. In this side of the work they have been supported by visiting qualified nurses, of whom there are now 466 whole-time and 600 engaged part time on local authority statutory work—*i.e.*, maternity and child welfare, school health, tuberculosis, etc. From personal observation of their good work and influence in the home of the tuberculous patient, I take this opportunity to add my meed of praise of this service. Details as to number of health visitors employed in the various local authority areas in Scotland will be found in a directory[12] issued by the Secretary of the Health Visitors Association.

Rehousing Tuberculous Families.—In certain especially of the more populous areas, it has been possible to rehouse tuberculous families in houses built under the Housing Act. Selection of these families is made on a public health basis—*i.e.*, where by this means segregation of a potentially infective case could be more effectively controlled.

Diagnosis.—The *bête noire* of the sanatorium superintendent in past years has been, and still is, the advanced stage of disease at which pulmonary cases are first brought under treatment. Much controversy has been excited over this question. But this is neither the place nor the occasion to enter the debatable ground. I will content myself by stating that roughly 10 per cent. of the deaths of pulmonary tuberculosis are of cases which have been either not notified or notified at or after death. The grid public supply of electricity is now fairly complete in Scotland. This and the advance in achievement of the portable X-ray unit should enable local authorities in the more rural areas to make improvement in this side of "field" service. So far in two county areas the tuberculosis officers report favourable results in diagnostic facilities by this means.

What of the Future?—Let me preface what I have to say by remarking that we have inherited a machine from the pioneer workers—research and field—in tuberculosis which it is our privilege and duty to keep bright and

free from the rust and decay of anything short of 100 per cent. efficiency. In doing this we must have regard to the ancillary services which have a bearing upon the individual from the cradle (and before this) to the grave—*i.e.*, housing, nutrition in the widest sense of the term, and other environmental factors such as the Keep Fit Movement, child welfare, school health services, assisted meals, milk to children, improvement in working hours and places, and ordinary and specialist medical services. One or all of these may have a bearing upon the case of established disease or upon the preventive side of the work.

As has been referred to earlier in this paper, there is now one bed per 900 of the population distributed over some 122 institutions. In spite of this, it is a fact that a waiting list is a not infrequent occurrence. This in the case of patients who are suffering from " active " disease is unfortunate. But fresh institutional developments should be on a regional basis to secure that standard of efficiency in equipment and personnel which is advancing with the passage of the years.

Rehousing of tuberculous families, and assistance, where necessary, with rent, will facilitate after-care and that very important function, the supervision of the contact. Roughly, in 20 per cent. of cases of tuberculosis a family history of the disease can be elicited. In fact a research undertaken in the Highland counties in Scotland showed a percentage of 28. This supervision should not be limited to the child contact if we would ensure success. Supervision must be continued throughout young adult life at least. Is it over-ambitious to suggest that the dossier at least of each member of a contact family should contain an X-ray film of the chest for purposes of comparison when, later in life, sickness from any suspicious cause ensues?

Observations along similar lines should be extended to the young adult, contact or other, entering upon factory or scholastic life. It might be argued that introspection might ensue from a policy so directed. But this will not arise if and when the line of action has been definitely established.

It does seem that some such special ancillary measures are required, since it has been found[13] in cases of young adult phthisis that their physical condition and incidence of disease of various kinds, as revealed by routine school medical inspection, differ insufficiently from those of comparable non-tuberculous persons during school life to be of any prognostic significance.

Propaganda activity, such as that of the National Association for the Prevention of Tuberculosis, is a valuable aid in bringing home to the " man in the street " the facts about prevention of disease. Just as the extension and growth of a knowledge of the nature of things, at first in small groups, gradually spreading to larger proportions of the general population, was

an important factor in civilisation,[14] so it might be argued that the future of preventive medicine, including tuberculosis, will depend very much upon the efficiency with which we get knowledge as to how to prevent disease and to preserve good vigorous health, mental and physical, across to the "man in the street."

Earlier in this paper reference has been made to the fact that modified colony and workshop conditions have been in operation in two centres in Scotland. The opinion has been expressed that Scotland's problem in this respect does not justify expansion along village settlement lines. An outlet has been found in Papworth and Preston Hall for a number of colonists from Scotland. As long as such an outlet remains open and is freely taken advantage of, further development in Scotland would not be justified. However, facilities to enable the ambulant sanatorium patient to enjoy the leisure hour should be more fully developed. This is usually a simple enough proposition in the case of the child. Thus in the larger institutions in Scotland the ambulant child attends "school" in a classroom in the institution, and the orthopædic case has "bed" tuition or handicraft. To satisfy the needs of the adult male is more difficult, and, although much is being accomplished, there is still a great deal to be done for him.

Much attention is given to the question of the after-care of the ex-sanatorium patient. The orthopædic specialist service in the industrial parts of Scotland will give second place to none, and even in the most outlying areas a very satisfactory service is available.

It has been pointed out, p. 190, that 47 per cent. of male and 39 per cent. of female pulmonary cases are held in institutions until death. Thus, the rehousing of tuberculous families, the other activities referred to in this paper, and therapeutic control by collapse therapy has eased considerably the problem of after-care of the potentially infective pulmonary case. But the problem has been by no means solved, and intensive consideration of the requirements of each case is still very necessary.

Summary.

A necessarily restricted survey of the campaign against tuberculosis in Scotland has been given. It can at least be said that we know a great deal more about the problem of tuberculosis than was possible before the inauguration of official schemes. Due emphasis has been placed upon the importance of preserving a critical outlook upon all activities engaged in the campaign, if we would preserve that degree of efficiency which is requisite for the fulfilment of our ambition to write off tuberculosis from our morbidity and mortality statistics. In greater measure perhaps than

in most medical problems there are in the campaign intense environmental (patient, physician, social, etc.) factors requiring first-class-team work for their solution.

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PEAMOUNT, THE IRISH PAPWORTH

BY ISHBEL, MARCHIONESS OF ABERDEEN AND TEMAIR,

G.B.E., LL.D.

I HAVE very gladly accepted the kind invitation to speak at this Conference on behalf of the Women's National Health Association of Ireland, as we are enthusiastic believers in the principles and system of care and after-care of the tuberculous which is the basis of the Papworth scheme.

I must ask your indulgence to be allowed briefly to explain how our Association became interested in the subject.

In 1906, soon after my husband was appointed Viceroy of Ireland, the public health authorities and other bodies came to him to put before him their anxieties as to returns showing a disposition to increase of T.B. in Ireland, and to discuss certain measures proposed to combat this tendency.

In the end, it was decided to form the Women's National Health Association on a popular basis, for the promotion of health in the homes of Ireland

and putting to the forefront a general campaign against tuberculosis and the care and after-care of mothers and children.

This was inaugurated by the Viceroy at a public meeting in March, 1907, and a travelling anti-T.B. exhibition was organised in connection with an international exhibition held in Dublin that year, and to which were invited representatives of local authorities, with a view of their arranging for visits of the exhibition to their own district, accompanied by lecturers. This proved a great success, and during the next two years visits were paid to most districts in Ireland, under the auspices of local authorities, and which resulted in the establishment of a network of local branches of the Women's Health Association all over the country, who were set to work to carry on the campaign and to show the people themselves, and especially the women, how essential their help was in the fight against the fell disease. Very great interest was aroused amongst all classes, and from that time the death-rate from T.B. has steadily decreased, till now it has decreased by nearly 50 per cent.

Several small institutions and sanatoria were also started, but it was not till the National Health Insurance Act of 1911 came into force that the provision of sanatoria was made a necessity.

The advisory committee appointed by the Government to recommend the steps that must be taken to make that Act effective explained in their report that, as far as Ireland was concerned, there was no possibility of providing the number of beds made requisite by a certain date by Mr. Lloyd George's promise, unless a voluntary association, like the Women's National Health Association, would undertake to provide emergency accommodation, receiving a grant for the purpose.

With this offer before us, we did not need twice telling, and the end of it was that we received a grant of £25,000, with which were established two sanatoria—one at Peamount, about eleven miles from Dublin, and the other at lovely Rossclare, near Enniskillen.

It soon became clear that what was intended as a temporary arrangement was likely to become permanent, as many local authorities preferred sending their patients to a central sanatorium, rather than building locally.

The war years, with all their grim accompaniments, emphasised the disinclination to incur local expense, whilst at the same time it rendered very difficult the task of our Peamount Committee of Management to carry on at the rate of £2 2s. a week per patient, and to provide the accommodation required.

Lord Aberdeen and I had to go to America to seek for funds, and we were also helped by generous friends in this country, their raising over £40,000, and through the zeal and devotion of our first chairman,

Sir William Thompson, and our medical and nursing staff, we managed to keep going, and to succeed to a limited extent.

But our experience was the same as that of other sanatoria. A fairly large percentage of patients improved in health and went home, though we always had and still have to deal with a large number who are sent in an incurable condition. But our trouble was that the patients who improved so often came back. They could not find work suitable to them—people were afraid of employing them, and the home conditions were likely to bring about a relapse.

And during their stay at Peamount we always felt the difficulty of providing occupation and interests which would give them something to think about besides their own health and future outlook.

And then Lord Aberdeen and I and Sir William Thompson had the opportunity of visiting Papworth, by Sir Pendrill Varrier-Jones's invitation, and we saw there at once the secret of success.

But it was not till 1929 that we were able to make a start by establishing the Peamount Industries, and adopting the Papworth plan of working for the establishment of a village settlement.

And we had the good fortune of being able to persuade Sir Pendrill to become our honorary director for some years, and under his guidance, and with the help of a manager, an Irish ex-patient trained at Papworth, we established our first workshop.

Unhappily, this coincided with the sudden death of Sir William Thompson, on whose direction and enthusiasm we had so much relied; but his friend Sir Conway Dwyer came to the rescue, and with his help and that of Lady Everard, and our present chairman, Mr. J. V. Coyle, and other workers on the committee, and our medical superintendent, Dr. Alice Barry, we are making good progress—indeed, astounding progress considering our difficulties.

Sir Pendrill was able to report that the first year's experience of Peamount considerably exceeded the results of the first year at Papworth.

Three men patients started to build their own workshop at Peamount at the beginning of 1930, with a capital of £230.

At the end of the year the workshop had to be doubled, the number of men employed had run up to forty, and the initial year's turnover amounted to £3,555.

Mr. L. J. Duffy, a member of our committee and the General Secretary of the Irish Union of Distributive Workers and Clerks, visited Peamount, and presented a very favourable report to the Annual Meeting of the Labour Party and Trades Union Congress.

And now, after seven years, our manager, Mr. Hall, reports that the aggregate turnover during that period is £63,818, and the wages paid

during that time, which are paid, of course, at Trade Union rates, amounted to £24,036.

The wages bill in 1936 amounted to £4,573, as compared with £1,015 in 1930.

The men have erected their own workshops, machine shops, hostel, the glove factory for the women workers, and the open-air school for the eighty child patients.

Orders for greenhouses and other wooden buildings have been received from all parts of Ireland, and we have already received orders for gloves which will occupy our women workers during all the year.

But over and above the results shown by these figures, the great asset of establishing the Papworth plan is the change of atmosphere it brings about in the whole institution.

Our doctor—Dr. Alice Barry—cannot emphasise this too strongly. Instead of listlessness and the depression, and the groups of patients hanging about, taking prescribed walks somewhat unwillingly, there is an atmosphere of hope all through the institution and its 350 patients, in spite of the fact that many of them will never be able to undertake any of the work themselves.

It is the creation of this atmosphere which has transformed our work at Peamount, and which makes the value of the system so self-evident.

Of course we cast envious eyes at the Papworth cottages and hostels and shops and village hall and surgical block and X-ray instalment and all sorts of interesting accessories belonging to the Settlement, and we wonder when we are going to find the kind friends to help us to secure similar advantages.

The men's hostel is doing well, but we have not yet been able to provide cottages for any of our settlers to whom they had been promised; we have a long list of patients—and particularly women patients—waiting for further accommodation; we are badly in need of an efficient X-ray instalment.

But we live in hope.

Friends in other countries think that because we have sweepstakes we must get all we need. But that is not so. We did receive £32,000 some years ago on condition that £8,000 was put aside for investment, but in the meanwhile the Hospitals Commissioners and Research Committee are still considering their policy towards hospitals in general, and T.B. work in particular. And, meanwhile, we feel we are not able to take advantage of the opportunities which our experience shows are within our grasp for the benefit of T.B. patients in Ireland, whose lives are meantime slipping away.

We want Sir Pendrill to be proud of his Irish child, although his work in England and his international work no longer permit him to act as our honorary director.

And for this purpose we desperately need some friends who will at least help us to put up some cottages so as to show Irish folk what a Village Settlement is really like, and so as to prove that we at Peamount are worthy of being the first member of the *International* Federation of Industrial Village Settlements where ex-patients in all countries may confidently hope to find health and happiness and the joy of being again self-supporting citizens, by accepting and acting on the inspiration of the Papworth ideals.

EXTRACT FROM REPORT OF THE DEPARTMENT OF LOCAL GOVERNMENT AND PUBLIC HEALTH FOR THE YEAR 1934-1935.

Incidence of Tuberculosis in Ireland.

It is of interest to compare the rate of mortality for all forms of tuberculosis at the time (1904) at which the disease was most prevalent in this country, with the rate of mortality at the end of each subsequent decade. The following figures emphasise the decline in mortality due to the disease:

Year.	*Deaths.*	*Death-Rate per 1,000 of the Population.*
1904	8,798	2·77
1914	6,344	2·03
1924	4,582	1·52
1934	3,514	1·17

The last-mentioned figures relate to the year under review, and the rate of 1·17 is the same as the new low record reached last year.

It was in the year 1914 that approved tuberculosis schemes first came into operation in some areas. In the ensuing decade, ended with the year 1924, the results of the Great War and other conditions affected the incidence of the disease, seeing that many men had contracted tuberculosis as a result of conditions of service. Despite these factors, the mortality rate had declined in the year 1924 to 1·52 per 1,000 of the population.

The fall in the mortality-rate from all forms of tuberculosis has been continuous since 1925, except for a slight set-back in 1931.

The death-rates in the Irish Free State from all forms of tuberculosis and from pulmonary tuberculosis for the year 1904, in which the incidence of the disease reached its highest point, for 1907, and for the year 1936 (the figures for the last-mentioned year are unrevised):

Irish Free State: Death-Rates Per 1,000 of the Population.

	1904.	1907.	1936.
All forms of tuberculosis	2·77	2·55	1·13
Pulmonary tuberculosis	2·17	1·97	0·89

The death-rate recorded for 1936 is the lowest yet reached in this country, and is, approximately, 59 per cent. less than that recorded for 1904.

THE PLACE OF OCCUPATIONAL THERAPY IN THE TREATMENT OF TUBERCULOSIS

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As the representative of the Occupational Therapy Association of Canada, I should like to refer briefly to the place which occupational therapy holds in the treatment of tuberculosis.

One of the generally accepted aims of modern treatment is to increase the number of arrested cases, and we believe that occupational therapy is admirably suited to assist in forwarding this very desirable result.

The fact that every up-to-date sanatorium in Canada is now equipped with an Occupational Therapy Department is satisfactory evidence that the medical profession considers it an important and necessary adjunct to the treatment of the tuberculous patient.

Dr. T. G. Heaton of Toronto, who has devoted a considerable amount of attention to the subject in a recent article,* divides the motives behind occupational therapy into four headings, namely: (1) Diversional; (2) Educational; (3) "Conditioning"; (4) Livelihood. These, I think, are all self-explanatory: diversional meaning to keep the patient happily occupied during his illness; conditioning, to build up his general physique; educational and livelihood, aiding in the rehabilitation of the patient after discharge.

One of the practical difficulties encountered in the adequate treatment of the disease lies in the fact that the majority of patients are young adults in active work with all that life has to offer before them. The sudden change from an active and busy life to one of enforced rest and prolonged, complete, or partial invalidism is bound to result in considerable mental distress, and it is not surprising that many cases are unable to adjust themselves to the new conditions and rebel against the restrictions to which they are of necessity subjected.

In such cases, particularly, occupational therapy is of the greatest value in that it assists them to adjust themselves to the less strenuous conditions of life, arousing their interest in new directions in which they can find pleasure and enjoyment in the long days to follow, or taking the oppor-

* This article is soon to be published in the Canadian *Journal of Occupational Therapy*.

tunity of their enforced rest to do further study in relation to their former occupation.

A contented mind will not only act beneficially on the patient himself, but will encourage him to co-operate in other methods of treatment designed for his welfare, and fewer patients will want to hasten their departure from the sanatorium against medical advice, thereby defeating the basic aim of the treatment—the arrest of the disease.

To be successful occupational therapy must be organised on a definite system by fully trained therapists working in close co-operation with, and under the direction of the medical staff. In certain of our sanatoria this co-operation is obtained by means of monthly meetings on each ward, which are attended by the doctor, matron, sister-in-charge, the therapist, and school-teacher. Each case is thoroughly discussed and the doctor prescribes the treatment, assigning the patient either to the school-teacher or the therapist, and in certain cases to both, stating definitely the duration of the daily work-periods.

In order to make the occupational therapy programme as effective and useful as possible, this department in the Mountain Sanatorium in Hamilton, Ontario, has recently incorporated vocational counselling in its services. The theory is that if it can be determined to what type of work a patient is best suited through inborn ability and interest, and provided that such a job is available, he will spend less energy in such work than if he were doing something which to him is uncongenial. Also, that it is important for the patient, on his discharge, to seek employment in the field of work to which he is best adapted.

The methods used in this vocational counselling involve careful interviewing, securing from the patient detailed information about his education, experience, interests, and ambitions, supplemented by a number of psychological tests for natural aptitudes. With the help of this information it can be ascertained whether a patient will do well in occupations requiring abilities in salesmanship, clerical work, mechanics, artistry, and so on.

At the present time, counselling is being given by a therapist to the younger patients—*i.e.*, those under thirty-five years of age whose prognoses are fair or good. No patient is allowed to undertake any tests unless he is very anxious to do so, but all patients have shown eagerness and appreciation to a marked degree.

Having summed up his assets, with the assistance of information and encouragement from the counsellor, the patient now plans, with her advice, to capitalise on his abilities and to develop them as much as possible during his period of convalescence.

A tentative plan for study, reading, and handwork is arranged by the

therapist with the approval of the physician, the persons who will be doing the teaching and the social worker, and on this plan are based the further activities of the patient while in the sanatorium.

When a patient has reached the ambulant stage in his convalescence, he has the opportunity of gaining some practical experience or further study in one of the departments of the sanatorium—*e.g.*, the radio department, the library, the office, the laboratory, the garden, and so on. On the discharge of the patient, the social worker, whose knowledge of employment conditions and whose contacts with employers in the community are invaluable, acts as a placement officer.

Although this vocational counselling is a great help to a number of patients there are others to whom it does not apply. There are those who have a poor prognosis, married women who will not be seeking employment after discharge, as well as a group which already has suitable vocations —*e.g.*, stenographers, clerks, and some from the professional class, such as physicians and engineers.

For these cases occupational therapy is a pleasant diversion. By interesting the patient in some new craft or reviving an old hobby, he becomes more contented and merges more readily into the hospital routine. As soon after admission as possible, some form of occupation should be prescribed. There is no one particular form of occupation which has been found of specific value.

The requirements of each patient call for special study and for the early cases, at any rate, the most suitable work will be that which entails the least physical and mental exertion while at the same time giving the greatest pleasure and satisfaction with a stimulating interest. To obtain this objective the therapist has at her disposal many crafts from which to choose. Some of these are: simple loom weaving, leatherwork, pewter modelling, drawing and painting, rug hooking, block printing, chip carving, raffia work, glove making, needlework, knitting, crocheting, simple bookbinding, celluloid etching; and for the ambulant patient attending the workshop the following may be added: light gardening, nature study, woodwork, chair caning, picture framing, light metal-work, shoe repairing, typing, dressmaking, basketry.

The period spent in the workshop gives the doctor a splendid opportunity of watching the patient's reaction to increased work-periods and more strenuous occupations, and he is able to make a far more accurate prognosis with regard not only to the amount and type of work the patient may perform on discharge from the sanatorium, but also whether he will be able to resume his former occupation, and if so, how long a time must elapse before he will be fit for it.

Dr. Spector of St. Louis, Missouri, admirably summarises the contributions which the trained occupational therapist can make to the problem of tuberculosis:

"In addition to its possible direct participation in the curative process, it indirectly acts as a sedative to the restless patient, as a stimulant to the depressed and discouraged patient. It resuscitates self-reliance in the over-hospitalised patient, and tends to resurrect initiative in the phlegmatic one. It instils hope and encouragement in the patient to start active life again, equipped with a philosophy that, despite his potential physical limitations, a useful, happy life is still within his reach."

THE RESETTLEMENT OF THE TUBERCULOUS EX-SERVICE MAN

By J. B. McDOUGALL,
M.D., F.R.C.P.(ED.), F.R.S.E.
Medical Director, the British Legion Village, Preston Hall.

It is my special duty today to speak to this Conference on the resettlement of the tuberculous ex-service man.

It is, I think, to the credit of this country that the tuberculous ex-service man was one of the very first to receive recognition from the Government after the Great War. It was realised that, of all disabled men, the tuberculous ex-service man presented a problem of ill-health, infection, and economic privation of a peculiar kind.

Ill-health in tuberculosis is, as you know, only too frequently a lifelong liability; the infectious nature of the disease makes the problem of treatment and rehabilitation an exceptionally difficult one, and perhaps the most difficult problem of all is to find ways and means of providing for the economic handicaps which ill-health, especially when coupled with infectivity, brings in its train.

The magnitude of the problem, however, did not deter the Government of this country from asking for, and obtaining, a considerable amount of money—not far short of a quarter of a million pounds—for the specific purpose of providing adequate facilities for the tuberculous ex-service man whose disease was more particularly associated with active service; and in less than two years from the Armistice a special committee was set up to administer this money, and the place chosen in this country for this great experiment was Preston Hall, near Maidstone, in Kent.

The principles which were to be followed were those which were adumbrated by Sir Pendrill Varrier-Jones at Papworth, and there were many who looked upon this repetition of Papworth as an important step forward in village settlement administration. And in fact it was. The organisation set up at Preston Hall was known as the Industrial Settlements, Incorporated, and this organisation started with every possible advantage at hand—adequate capital, a site of exceptional value from the commercial standpoint and extremely suitable from the medical standpoint, and a certainty of filling all the beds at their disposal; further, the Ministry of Health, the Ministry of Pensions, and local authorities promised their co-operation and support.

A trained staff of men—most of them healthy individuals, however—were employed as instructors and specialists in the various pursuits it was proposed to follow: carpentry, joinery, gardening, horticulture, poultry farming, and pig rearing. But perhaps the greatest advantage of all that the Industrial Settlements, Incorporated, had was a prosperous community with a high purchasing power, for you will recall that between the years 1920 and 1924 prices were high and business was at its best.

Surely a village settlement could not have been established at a more propitious time, especially when one considers that it was the desire of every member of the community to make homes fit for heroes to live in! Yet the scheme, as at first outlined, was not the success anticipated. It is, of course, easy to be wise after the event, and I am sure my colleague, Sir Pendrill Varrier-Jones, and I, who have probably had more experience than most people in village settlement administration, will be the first to admit that we also have had many failures from time to time. It appeared, however, that a large variety of causes contributed towards the difficulties with which the original Preston Hall scheme for disabled ex-service men was faced. In the first place, there must be little doubt that the fundamental medical outlook, which is so essential for the success of any village settlement, was placed too much in the background by those responsible for the work, with the result that many patients were dissatisfied, and on their return to their own homes gave unfavourable reports as to the methods employed.

Further, the industries were not all suitable for the class of patient likely to receive benefit. Frequently very long hours had to be worked in certain sections, and the horticultural enterprise especially necessitated much overtime.

From these errors we have learned a good deal, and it seems clear that any successful village settlement must always insist that medical principles shall take precedence over every other factor in the life of the community.

I should prefer to go even further and say that the work which is taking place from day to day in any of the departments of a village settlement is a specialised form of treatment, and that the tool with which the man works, or the machine which he is running, or even the books which he uses for purposes of account-keeping, are integral parts of his medical prescription.

We have learned also from our predecessors, and from similar experiments in other places, that horticulture and gardening, as such, present many limitations for the tuberculous sufferer. Gardening, especially, incurs long hours and frequently arduous work, for which few tuberculous patients are suitable. But perhaps the greatest lesson that we have learned is that the specialists for the various departments of the industries—in other words, the leaders of the departments—should be recruited where and when possible from the tuberculous population which is admitted to the sanatorium in association with the settlement. It has been said frequently, and with complete justice, that the healthy, non-tuberculous individual, who may have a specialised knowledge of factory administration, may even be a menace in a community of the kind we are discussing.

In 1925 the British Legion in this country was asked to assume control at Preston Hall, so as to maintain the continuity in the treatment of tuberculous ex-service men; and they accepted the challenge. It was under the able guidance of Sir Pendrill Varrier-Jones that Preston Hall started its new lease of life, and it was my privilege to take over the charge of Preston Hall, under the auspices of the British Legion, in the early part of 1927. At that time there were only ninety-three patients in residence in the sanatorium, and only some thirty odd men living in houses in the village and working in the industrial departments attached to the sanatorium.

Year by year since then new developments have taken place, additional beds have been placed at the disposal of local authorities for the treatment of patients, and new workshops have been set up for finding employment for ex-service members of our patient population. In many respects the problem at Preston Hall has been one of the most difficult to solve, because we have been limited hitherto to a selected group of the population—namely, the ex-service man. That is to say, the average age has been increasing year by year, until today the average ex-service man has reached his forty-seventh year and, when afflicted with pulmonary tuberculosis, he is anything from five to ten years older than his birth certificate tells.

It has been said by some, also, that the temperamental qualities of the ex-service man have made the problem at Preston Hall particularly difficult, but I should not personally subscribe to that view. I have seldom experienced any difficulty on this score. On the other hand, I could quote innumerable examples where the genuine comradeship of the men

I have had under my control has come forward—sometimes when least expected—and has been responsible for a co-operation and *esprit de corps*, to which you yourself, sir, referred this morning, which is lacking in many mixed institutions which I have visited and seen.

The Village Settlement at Preston Hall has grown in precisely the same way that Papworth has grown, and, except in matters of detail, the principles employed at both institutions are substantially the same. If our actual rate of progress has been a little greater than that at Papworth it is perhaps because we have had the benefit of a large and relatively wealthy national organisation to provide the capital which my friend Sir Pendrill Varrier-Jones finds it so difficult to ask for but so easy to obtain; and also because we have followed the maxim that a village settlement must grow only in accordance with the success which accompanies both the medical and economic phases in its constitution. One has seen, in this and other countries, not a few examples of a village settlement endeavouring to establish itself overnight; but I have yet to learn that any scheme based on this conception is likely to meet with lasting success.

At Preston Hall we have now accommodation for 300 patients suffering from pulmonary tuberculosis; treatment of all kinds and descriptions is available, from the original rest-cure of Dettweiller up to the latest procedures in thoracic surgery. Side by side with the expansion of treatment facilities have come new methods in diagnosis, and it has been particularly on the radiological side that we have, at Preston Hall, gone perhaps a little further than most other institutions. The medical facilities in the sanatorium are, of course, available for all residents in the village when occasion demands, and the evening clinic and the child welfare centre, and the routine examinations are all part and parcel of the medical make-up which I have already insisted upon, and which I believe is so essential in an institution of this kind.

On the purely industrial side we have our portable building department, printing, graining, fancy goods, village stores, "soap" section, and the special departments for electricity, painting, engineering etc. We have even utilised the places on the hospital staff as orderlies for certain ex-patients who are regarded as medically suitable.

I do not propose today to go into a detailed description of the work in the individual departments of the industries, except to say that modern machinery must play a very important part in all workshops in a scheme of this kind. It is, of course, also essential to have a good sales organisation, as it is in any ordinary business; but if the products are good and the price is right there is no reason in the world why trading in the open market cannot be as successful in a village settlement as in any outside organisation.

It is true that many of the men earn wages which are perhaps in excess of their economic value; but against this must be placed the fact that no interest on capital is usually charged against the industries, since the money for capital expenditure has been voluntarily donated. Also, there are no directors' fees to be paid, and no shareholders clamouring for dividends; and there are even advantages frequently to be had on account of the low rental which should be placed against the individual departments.

I am frequently asked by visitors whether it is not extremely difficult to sell goods made in the industries attached to a village settlement for the tuberculous, but I am bound to say that although there may be certain prejudices by private individuals yet large wholesalers and business houses have never, to my knowledge, raised any objection so long as the business side is satisfactory. I remember also a medical colleague in the west of Canada criticising village settlements in England by saying he was perfectly sure that it was the short distances in England, for transport purposes particularly, which made it relatively easy to dispose of goods, and that a similar experiment in Canada would, owing to the long distances involved in transport, meet with complete failure. When the meeting was over I had the privilege of taking my colleague to one of the best-known stores in Winnipeg, and there I showed him certain goods which had actually been made by the tuberculous ex-service men at Preston Hall in Kent.

Today the industries at Preston Hall are selling to the public of this country and our Colonies not far short of £90,000 worth of goods per annum, and the Village Settlement proper at Preston Hall has grown from the original 30 odd men in 1927 to 185—all ex-service men and all disabled with pulmonary tuberculosis; more than 50 per cent. with tubercle bacilli in the sputum, and a number actually with some form of collapse therapy thrown in to enable them to carry on with their economic rehabilitation.

One other question which has been asked sometimes in connection with village settlement administration is: "To what extent can a scheme of this kind grow?" My reply to a question of that kind is usually that the ultimate size is regulated by two factors—finance and administration. On the question of finance I can quote some figures so far as Preston Hall is concerned which may be of interest. For the seven consecutive years ending September 30, 1936, there was an *average* annual loss at Preston Hall of £662. During this period it is estimated that there have been on an average 150 settlers and 250 patients under treatment and supervision each year. The net cost to the British Legion, therefore, has been approximately 30s. per man per *annum*.

I think it is quite possible to improve on that financial result, but by

doing so there would be a tendency to impair the very objects for which the scheme as a whole exists. Like all of you, I would deprecate waste, financial extravagance, and gross mismanagement; but I am not so certain that many of the schemes in the past have not falled on account of the tendency in so many quarters to view the results of work of this kind on a purely cash basis.

The Minister of Health, in his 1932 report, said:

"The maintenance of a tuberculous person and of his wife and family in a village settlement is the most valuable piece of tuberculosis after-care work that has yet been devised. Also, a subsidy to a patient in a village settlement is more economic than allowing the patient and his family to be supported, entirely unemployed, from the Public Assistance Funds, at the same time being a potential source of infection to others. The pecuniary difference may be as great as between 10s. a week in the one case and several pounds a week in the other."

I venture to suggest to this Conference that, even had the loss at Preston Hall and at Papworth amounted to twenty times as much per man per annum as the figure I have just given, yet the principle would still be well worth while. I sometimes think it is a pity that we cannot mutate the disappearance of moist sounds in the lungs into receipted invoices on a balance sheet, and I have very frequently wondered what the country would be saved financially by adopting on a large scale the dictum, not of Papworth, not of Preston Hall, but of the Ministry of Health, which I have already quoted. A unit after the Papworth and Preston Hall pattern is capable of healing a tuberculous lesion by every way known to medicine, surgery, and industry, and even after the physician has done his best, and when the surgeon has operated on his patient with consummate skill, the economic future of the patient must still be a matter awaiting solution. Infectivity may, it is true, have disappeared; physical resources may, it is also true, be recovered; but the patient with definite tuberculosis is never likely to become absorbed into ordinary industry, and must, therefore, always remain a burden on the administrative and financial departments of the State.

The great problem for the future of the tuberculous ex-service man—as, in fact, for all other groups of tuberculous individuals—is to devise ways and means of limiting this liability as far as possible; and the figure I have given you as the result of seven consecutive years of work on behalf of the tuberculous ex-service man is, I hope, some contribution to the problem as a whole.

TUBERCULAR SOLDIERS' AID SOCIETY

(ADELAIDE, SOUTH AUSTRALIA)

By DOUGLAS M. DEANE.

Representing the Tubercular Soldiers' Aid Society.

THE work of the committee of this Society is entirely after-care. All activities have been carried out upon the advice of honorary medical advisers. Active interest in tubercular ex-soldiers commenced in 1918, but it was in 1921 that the Aid Society was formed at the request of the Tubercular Soldiers' Association.

You remember the anxious days of 1914 to 1918. Funds were easy to raise for the sick and wounded, and we gathered and distributed money for relief and cheer with ease and unsurpassed unity. The passage of years has dulled that ardour, and a great amount of work and time has to be spent on organising entertainments to raise funds. The Society has no reserve fund, and collects year by year the amounts devoted to the cause. Since 1921 £75,000 has been raised and distributed in relief among non-pensioners and their families, among the widows and children of deceased T.B. ex-soldiers, and in the establishment and maintenance of Angorichina Hostel.

We know the men and their families and the widows of the deceased and their children. We record their financial positions and visit their homes. We see them, too, when they are patients in hospital. We arrange outings, meetings, reunions, and other social gatherings.

T.B. Soldiers' Association.—The T.B. Soldiers' Association has approximately 300 members and keeps the men together. They have their own secretary, and we supply them with an office and meeting-rooms in the same building as the Aid Society. The Association deals with pension matters and is part of a Federal Scheme with branches in the other capital cities, in Brisbane, Perth, Melbourne, and Sidney. A Federal Conference of members is held annually in one of the above centres. We finance them for payment of their secretary, office expenses, and Federal Delegate as necessary. The Federal numbers of T.B. ex-soldiers on pension are 2,764 up to June, 1936. The men thus organised for pension matters, for relief and education, have an excellent standing with the Federal Government, who give their appeals for pension every consideration.

To obtain a military pension a patient must prove his disability due to

war service. Under this scheme the ordinary rates are paid, and in addition a special rate of £4 per week when the man becomes seriously ill. Lately the Commonwealth Government, which controls all ex-soldier affairs, has acceded to the request of the T.B. Soldiers' Association and granted a general service pension for proved T.B. cases. This is 19s. per week. Tribunes sit in the various States to hear cases and to grant and assess pensions.

T.B. Soldiers' Women's Association.—Approximately 300 women—wives, widows, mothers, and daughters—form this association. We have found this an excellent medium for having children contacts examined. The gatherings are for social and educational purposes only.

T.B. Soldiers' Children's Clinic.—Through the co-operation of the Adelaide Children's Hospital and the Junior Red Cross Society, facilities were made available in 1933 for the examination of all children contacts. This was a decided move in preventive measures and has proved that the children of military pensioners—especially where the income is adequate—are unusually healthy as a group, but non-pensioners' children more frequently suffer symptoms where home conditions are poor. Suspected or positive cases have been under continual treatment and observation at the hospital.

Imperial Army Men.—They have always been accepted for membership to the T.B. Soldiers' Association and as eligible for the Society's relief. They are accepted, too, as patients at the Angorichina Hostel. The Australian Repatriation Department provides £15 for burial expenses of deceased ex-Australian soldiers. No such scheme exists for Imperial men, and we have provided funeral expenses for many deceased T.B. British soldiers, that the relatives of these men may be spared the indignity of a pauper's grave following service in the Great War. The majority of sick British Imperial T.B. men here are in distressed circumstances.

Angorichina Hostel (Report by Dr. Browne).—Angorichina Hostel was established in 1927 by the Tubercular Soldiers' Aid Society as a winter home for T.B. ex-soldiers who had had long medical or sanatorium treatment. It is situated in a picturesque valley of the Flinders Ranges, approximately 350 miles north of Adelaide, at an elevation of about 1,250 feet above sea-level. Mountains in the vicinity reach a height of 3,000 feet. The country is rugged and arid, and often the rainfall does not reach five inches a year. Great gums crowd thickly in the many creeks which are dry except at flood-time, and native pines grow on the rocky hillsides.

There has for a long time been a belief, very generally held, in the curative virtues of the air of inland Australia in the treatment of tubercular diseases, and it was to take advantage of this supposed curative power that Angorichina was founded.

While it was generally admitted that the warm, dry climate of inland Australia was frequently of benefit to sufferers from tuberculosis, it was also evident that the dust-storms to which these districts are occasionally liable were not at all beneficial.

The great advantage of the peculiar position of Angorichina is that, situated as it is in a valley surrounded by mountains of considerable elevation, it frequently seems to escape the dust-storms which sweep the neighbouring plains. At all events, it was in the hope of benefiting soldier sufferers from pulmonary tuberculosis that Angorichina was founded, and in that hope it has carried on since.

It has now been in existence for nine years, and in that time has grown from a central hostel, with a few outlying tents, to a small settlement, consisting of a central block and about four chalets and other buildings. It can accommodate up to twenty-two patients. There is a kitchen and an adequate dispensary, a cool semi-underground storage-room, numerous verandas and shade-houses, a nurses' chalet, community living- and rest-room, three residential chalets, and a garage.

From the beginning an attempt was made to lay out a garden and to interest and invite the co-operation of the patients in the general running of the establishment. Angorichina had to be self-contained. It had to provide its own water supply and drainage systems. It endeavoured to grow its own vegetables, although it could not grow wheat or pasture for cattle.

The patients entered heartily into the planning and construction-work necessary in these various activities, and as time went on others were added, including a workshop for woodwork of all kinds, furniture-making, and so on. An up-to-date plant for chicken-rearing was erected. Our experience has been that the patients in general did not need encouragement to work, but rather a good deal of supervision to see that they did not work too much.

The type of case admitted to Angorichina is in general the more or less advanced chronic pulmonary tuberculosis, and our experience has been that by far the most generally useful method of treatment in such cases is occupational therapy.

It is on these lines that the famous Papworth Settlement in England has been administered. Angorichina is not by any means a slavish imitation of Papworth. It is in Australia, not England, and has developed in accordance with Australian conditions and character.

I have been intimately concerned in dealing with and advising on the many purely medical problems arising in connection with Angorichina Hostel since its inception. My general impression is that, considering

the difficult nature of case admitted—difficult, that is, to treat and cure—the results are good. A local doctor from Hawker (sixty-six miles away) visits the Hostel monthly and oftener if required.

The benefits obtained are not confined to the actual improvement in the lung conditions of the patient, although that is frequently quite marked, but also in the improvement in his morale, the increased cheerfulness of his outlook, and his much greater hopefulness and courage. These latter benefits react, of course, on the patient's relatives and friends when he returns to them.

I think that, at all events for about ten months of the year, the climatic conditions at Angorichina are favourable to sufferers from pulmonary tuberculosis. In January and February it is rather hot, and it has been found advisable to bring the patients further south during these months.

TUBERCULOSIS CONTROL

By G. LISSANT COX,
M.A., M.D.
Central Tuberculosis Officer, Lancashire County Council.

I HAVE been asked to deal this afternoon with some principles which may guide us in the control of tuberculosis, illustrated by our scheme and results in the Administrative County Palatine of Lancaster.

The causes of tuberculosis are so varied, its various forms legion, its effects so serious and widespread that it is always very difficult to see the problem whole. I intend to discuss some practical measures for its prevention and treatment, which have been tried out now in Lancashire for twenty-five years, and it will be well, I think, to limit the field I shall try to cover.

We started with practically a virgin field. We had not, as regards the public health services, a single bed, dispensary, nurse, hospital, or doctor. We were in much the same position as parts of the Empire may be today. What, then, did we do? We built up our scheme on this foundation: *Find, Isolate, Educate, and Treat the adult positive case.*

All schemes dealing with the control of tuberculosis endeavour to combine prevention with treatment. It is this which at one and the same time makes the problem so difficult and so interesting. If the measures taken over-emphasise treatment, as is often the case, we shall have a poor scheme and faulty control. The importance of prevention is seen when

we realise that some 60 per cent. of adult pulmonary cases of tuberculosis die within five years of coming to our notice.

To come, then, to our text: How shall we *Find*, *Isolate*, *Educate*, and *Treat* the adult positive case?

Finding.

First to *Find*. The means to be employed here will be the well-tried ones of notification and active co-operation between family doctor and whole-time municipal or state doctor. This co-operation is of primary importance. It is possible to measure, in England at any rate, the degree of co-operation, not by the notification of cases, but by the number of persons sent to the official doctor—called the tuberculosis officer in this country—*before* notification for an opinion as to diagnosis. In Lancashire we have 91 per cent. of all our new cases dealt with thus.

To get a high degree of co-operation between family doctor and official doctor, certain things are necessary.

1. A real expert to be consulted; a poorly paid, poorly qualified tuberculosis officer is no good.

2. The community must provide him with efficient tools and laboratory facilities. For example, diagnosis can seldom be complete without the use of X-rays; they are wanted every bit as much as the thermometer and stethoscope. Modern surgical treatment for pulmonary disease cannot be given without their aid.

3. There is the thorny question of hospital beds for the expert. I hold very strongly that no doctor can fill his rôle as a consultant if he has no hospital beds under his control. To do this, to combine what may be called the preventive or dispensary unit with the treatment or institutional unit, we have split up our Administrative County of a million acres and nearly two million population into areas, each with its sanatorium-hospital and each managed by a team of doctors. We have tried, in short, to combine the dispensary side of tuberculosis work with the institutional side, a matter, in my opinion, of great importance if we are to see the problem whole and so hope to control it in the best possible way. Unfortunately we still find, a relic I suppose of the application of the sanatorium principle by Walther in the Black Forest, the erroneous belief that all a county or province needs to control tuberculosis is the erection of a sanatorium in some absurdly isolated spot. Finally, the combination of the dispensary and institutional units under one tuberculosis officer, which we have found so efficacious in Lancashire, might be equally if not more useful in big, sparsely populated parts of the Empire.

Isolation.

Now as to *Isolation* of the adult positive case. We have always believed, and still do, in the isolation of the positive case, and from the beginning made provision to keep infective patients in hospital as long as they would stay. To do this we find, with a population of 1,821,100 and an incidence-rate of 1·12 per 1,000 (pulmonary 0·73, non-pulmonary 0·39), we require 763 beds for adults and 194 beds for children (pulmonary 680, non-pulmonary 277).

At any one time we have in Lancashire 15 per cent. of the adult pulmonary patients in sanatoria or hospitals—there undergoing treatment or isolation or both. Taking separately cases classified as "T.B. plus," we have correspondingly 23 per cent. in institutions. The 77 per cent. at home include cases which have ceased to be positive—and most of them have satisfactory homes.

The number of deaths from pulmonary tuberculosis in our sanatoria and hospitals and in Poor Law institutions is 288 per annum. It is usual, on sentimental grounds, to let advanced cases return home shortly before death; only the patients with very bad home circumstances are retained until death.

Our number of deaths from pulmonary tuberculosis per annum is at present 855. Twenty-five years ago it was 1,528. We have 680 beds, which is just about enough for the 855 pulmonary deaths. Considering that many deaths take place in mental and public assistance hospitals, we may say that one sanatorium-hospital bed per pulmonary death will give a fairly good control as far as hospitalisation of the patient is concerned.

I cannot, of course, leave the factor of isolation without referring briefly to environment. A good environment is of great importance as a factor helping to further the *prevention* of tuberculosis. The most striking combination of a very good environment with isolation of the patient is the village settlement. The settlement for Lancashire patients is the East Lancashire Tuberculosis Colony.

Education.

Pulmonary tuberculosis is a very insidious disease in its onset, and there is great fear of it in the minds of the public. It is by *education* that this fear can be reduced.

All schools ought to be open-air schools; all children should be taught hygiene more thoroughly than at present. The tuberculosis medical service tries to play its part in the education of the adult in the hospital and in the sanatorium; and the tuberculosis health visitors of this country render valuable service in educating the adult in the home. As evidence

of the value of the work of the tuberculosis health visitors in Lancashire, here are some convincing statistics: In 1920, of 1,849 patients considered to be infectious, 209 (or 11·3 per cent.) had not a separate bed; in 1936, the corresponding figures were: 1,872 patients considered to be infectious, and only 76 (or 4·0 per cent.) without a separate bed.

Treatment.

This I have placed last in order to emphasise prevention.

We know that *treatment* for non-pulmonary tuberculosis is successful. About 80 per cent. of patients recover from this form of the disease. But it is not so with the pulmonary form. A recent careful enquiry into our cases showed that of 1,097 definite pulmonary cases, 63·1 per cent. died from tuberculosis within five years. This emphasises once again the importance of prevention. While methods of diagnosis have improved, while new methods of treatment are tried and not without success on individuals, it still remains that the best results in anti-tuberculosis work obtain by detailed, unobtrusive and continually applied measures for the *prevention* of this disease.

We must, of course, treat our patients, and as just indicated modern, especially surgical, methods of treatment do arrest the disease in a minority of individuals. We do find in Lancashire that there is a definite, though relatively small, improvement in the number of cases of pulmonary tuberculosis which are arrested by such modern methods of treatment as artificial pneumothorax, phrenicectomy, and thoracoplasty. In Lancashire we write off our registers as arrested or recovered, on an average of the last five years, 256 pulmonary cases each year.

Treatment has always been free—a policy which I consider has helped to give us our reduction in case incidence and mortality. Only 2·6 per cent. of the total cases notified decline treatment under the county scheme, and the majority of these have special facilities for proper means of prevention and treatment.

Under treatment comes that part of a scheme dealing with the care and after-care of patients. This part of tuberculosis control is being dealt with so fully that I just mention it. It is an important part of any scheme, and is most highly developed in the village settlement. Our Lancashire scheme includes provision for active co-operation with the East Lancashire Tuberculosis Colony, and we have recently agreed to subsidise each settler from Lancashire.

Cost.

The net *cost* of the Lancashire Tuberculosis Scheme for the year ended March 31, 1937, was £197,000, equal to £108 per 1,000 of the population.

Results.

The following statement shows the decline in pulmonary and non-pulmonary tuberculosis in the Administrative County of Lancaster during the past twenty-one years:

ADULTS AND CHILDREN.

	Death-Rate per 1,000 of the Population.		
	Pulmonary Tuberculosis.	*Non-Pulmonary Tuberculosis.*	*Tuberculosis (All Forms).*
1914	0·87	0·32	1·19
1935	0·46	0·10	0·57
Percentage drop in twenty-one years ..	47	68	52

	Case-Rate per 1,000 of the Population.		
	Pulmonary Tuberculosis.	*Non-Pulmonary Tuberculosis.*	*Tuberculosis (All Forms).*
1914	1·61	0·65	2·27
1935	0·71	0·36	1·08
Percentage drop in twenty-one years ..	55	44	52

Dealing with children under fifteen years, the following statement shows the decline which has taken place:

	Death-Rate per 1,000 of Child Population.		
	Pulmonary Tuberculosis.	*Non-Pulmonary Tuberculosis.*	*Tuberculosis (All Forms).*
1914	0·26	0·77	1·04
1935	0·04	0·20	0·24
Percentage drop in twenty-one years ..	84	74	76

	Case-Rate per 1,000 of Child Population.		
	Pulmonary Tuberculosis.	*Non-Pulmonary Tuberculosis.*	*Tuberculosis (All Forms).*
1914	0·90	1·34	2·25
1935	0·14	0·87	1·02
Percentage drop in twenty-one years ..	84	35	54

We have built up a scheme for the control of tuberculosis on the foundation of Find, Isolate, Educate, and Treat the adult positive case. It is to be expected that an efficient scheme will produce good results, and we in Lancashire have not been disappointed in this respect. From 1914 to 1935, as the table above shows, the death-rate from pulmonary tuberculosis in

the Administrative County declined from 0·87 to 0·46 per 1,000 of the population, a reduction of 47 per cent. In 1914, non-pulmonary tuberculosis was responsible for a death-rate of 0·32 per 1,000 of the population, and in 1935 the rate had fallen to 0·10, a reduction of 68 per cent. The number of new cases also has steadily declined: each year since 1924 has shown a reduction in the number of pulmonary cases, and comparing 1924 with 1935 there has been a drop of 34 per cent.; the number of non-pulmonary cases has fallen 40 per cent. since 1924.

FIFTH SESSION

CHAIRMAN: THE RT. HON. THE VISCOUNT GOSCHEN, G.C.S.I., G.C.I.E.

TUBERCULOSIS IN TASMANIA

BY THE HON. FRANCIS GAHA.

THE problem in Tasmania is comparable in every way to what exists elsewhere, but like many of the outposts of the Empire where communications are not nearly so satisfactory as they are in the more highly developed portions, we have particular phases that present difficulties in themselves.

It might be thought of a State like Tasmania, that is world-famed for its climate, reinforced by the better social and feeding conditions of the Australian people generally, that tuberculosis should not be a problem of moment, but I can assure you it is, although I believe that in common with the rest of the world its incidence is being reduced as well as its virulence. Our three principal obstacles are organisation, difficulties of transport, and public apathy. It may be truly said that as a consequence of wider public activity and better facilities for bringing health to the notice of the people, the public are more health-conscious than ever before. Combined with this there is to be seen wider evidence of governmental interest in all problems of health. The consequence is that the Tasmanian people are moving in a new direction in regard to public health generally, and particularly with tuberculosis.

As soon as you intensively educate the people they commence to look at social problems from new angles, and it is quite common in the State to hear people remark: "Why should we get preventive diseases at all?" And it is clear to me that the mass mind is moving away from its hitherto desire to learn of cures to thoughts of ways and means of prevention. This, I think you will agree, is salutary.

At the present time we are reorganising our central tubercular service. From the administrative and treatment points of view such will follow established lines in this country, but we are confronted with the social difficulty that is not easily overcome in an independent-minded person

like the Australian. We have to take our people in some instances as far as 200 miles away from their home, family and associations to put them in the central institution set apart for special treatment, simply because it is the only economical and scientific way that the tuberculosis problem can be handled by us. Naturally, the usually optimistic tubercular-infected person rebels at being transported so far, and in consequence we have been in the past dealing with a later type of tuberculosis than can be found in more popular centres where clinics can be readily located.

It can be gathered from these few remarks that where tuberculosis occurs in families that live remote from any established method of communication, and have to be brought to a railhead, and then transported long distances to the central institutions set apart for the purpose, and amongst whom rests the independent spirit that I have mentioned earlier, combined with the optimism of the tubercular, we do encounter real difficulties. Many of these, however, will be overcome largely in the immediate future. The Government is about to establish a full-time free medical service for people living in the remoter portions of the State. The medical officers so appointed are to be part of a central medical scheme run in conjunction with Tasmania's public hospitals, which, for the most part, have been, during the past forty years, State supported. The intention is not to put medical officers into these remote parts and leave them there. They are to be drafted back to the cities at frequent intervals and allowed to do refresher courses in the hospitals as resident medical officers, so that they will not lose touch with medical and scientific progress, and at the same time this will enable them to obtain experience in any particular problem of medicine relative to the area in which they reside. In this way we believe that we will be able to induce people to come up earlier for diagnosis and, incidentally, induce them to seek earlier treatment in the curable stages of the disease.

Some of my medical listeners will be shocked at the nearness of this new scheme to nationalisation, but how are we to deal with the problem otherwise? Districts in themselves will not support medical officers, disease is there to be dealt with, and whilst the people of the cities have all the facilities offered them free, the people of the remoter areas from which we obtain many of our advanced tubercular cases have not these facilities and are as much entitled to the benefits of science as any other section of the community.

A central sanatorium along modern lines is in process of development, and a big step forward to replace the older methods of administration by the new is being carried out at the moment. But the great problem of the State in the past has been how to get the cases to come up earlier for

treatment. Our results have not been satisfactory, despite all our social advantages, simply because the people have lacked the facilities to secure early enough recognition of the disease.

I would like to make a passing reference to the small native population. Some sixty or seventy years ago, in order to preserve the half-breeds, they were placed on a fertile island near by, where the climate is a little more temperate than that which prevails over the State generally, and where considerable fertility of soil exists. Despite in-breeding they have been able to maintain their population. Their habits, generally speaking, are essentially native. In the settlement itself they are notoriously lazy and unprogressive and no amount of education has been able to animate them. Removed from the island and employed by the whites, in many instances they have turned out to be most satisfactory workers, reasonably intelligent, but lacking in stability, and it is one of the social problems of the future as to how we are to deal with this population. Tuberculosis is thought to be rife among them, but our investigations rather show that they possess a higher resistance to it than the usual native population elsewhere, and we have caused some preliminary investigations to be carried out to try and ascertain the reason why they seem to enjoy this greater immunity, and we believe that the dietetic factor plays a considerable part. The natural occupation they would seem to indulge in is the mutton-bird industry. This strange sea-bird returns to its nest on a certain day almost to the hour, and these half-castes turn out in full strength and search the burrows for the almost full-grown mutton bird, which is extremely fat, and from which can be extracted an oil resembling cod-liver oil in many particulars. These are salted down and kept in barrels and form the staple diet of the people. A considerable quantity, cooked in many ways, is consumed by the general population, and mutton-bird oil is used in large quantities by the public generally as a cure or preventive of chest troubles. Whether it is the high nitrogenous and fatty diets that come from the consumption of the mutton bird that keeps the native resistance high, I am not prepared at this juncture to state. At the present time we are having mutton-bird oil investigated as to its vitamin content, and I do know that after a personal investigation of the native population myself, taking native races as a whole, I believe these are as free and as resistant as any to tuberculosis.

I regret that time will not permit me to discuss widely the problem of tuberculosis as it affects the State, but, to epitomise our present activities, we are causing the central sanatorium to be remodelled with sufficient beds to deal with the whole question of sanatorium treatment for the entire State, and it is proposed to retain a high degree of medical efficiency. Where

centres of population permit we intend to adopt the British method of tuberculosis clinics classification and ambulatory treatment generally. For the remote centres of population we are going to put in fully paid medical men to offer free service to the people for all forms of disease. Motor ambulance units are to be installed to facilitate transport; the radio is to be used frequently for health talks to the people, because it has been found that a very high percentage of the Tasmanians possess radio sets and are good listeners and eagerly seek health instruction. Our State schools are giving elementary instruction in personal hygiene, and the cult of fresh air and sunlight is being widely advocated; our hospitals are examining their nurses by having all probationers X-rayed on entrance and checked up at intervals during their training periods. Some of our metalliferous industries are subjecting all those engaged in such to periodic X-ray, and efforts are being made to reduce the incidence of what was generally known as miners' disease, and we have an Occupational Diseases Act to enable those affected or infected to be adequately compensated so that they may be removed to another sphere. Lastly, and one of the most important points of all, we are activating the agricultural department to deal with the proposition of tuberculosis in cattle, so that as far as possible we may be permitted to offer a pure milk supply to the public.

In conclusion, I might add that no remarks, however eloquent or intellectual, seem to fit the bill if they do not contain at least one controversial brick, so please let me drop mine. Then it can be said that however inaccurate may have been my statements, at least it will be remembered that I have spoken. I believe all British communities are far too conservative on the whole problem of milk consumption and food supplies generally. So long as milk is to be one of the staple articles of diet and at the same time the most fruitful medium for the dissemination of diseases, so long must we determine clear-cut lines for dealing with it. You all know its relationship to the spread of bovine tuberculosis—there is no need for me to amplify this. It becomes imperative that we must not only guarantee to the public a pure milk supply, but as well use every available means to teach them to keep it pure until it is consumed.

We seem to have some clear-cut lines, and others not so clear, but more readily accepted and full of difficult possibilities. I am growing more convinced with the years that milk-grading and tubercular herd-testing are far too insufficient methods for dealing with this commodity, possessing as it does so many dangerous aspects. The public should at least demand a bacteriologically sound milk, and for preference a product of adequately supervised municipal pasteurising schemes. Personally I would be prepared to go even further and recommend the simple " understood-by-all "

method of boiling or scalding, and replacing the destroyed or reduced vitamins in accordance with our existing knowledge of the subject. Such a procedure demands the all-or-nothing rule, and I believe that from it would follow an appreciable reduction in the incidence of at least bovine tuberculosis, to say nothing of the salutary effect of creating a wider anti-tubercular conscience—in fact, a wider general health outlook must follow.

The time has arrived for the investigation of milk in relation to tuberculosis and health generally, and for revolutionary methods in dealing with this highly necessary and at the same time highly dangerous commodity. I would like to make it abundantly clear that I am not blaming milk supplies for the entire incidence of tuberculosis, nor am I stating that a pure milk supply will eradicate it in its entirety; but it has to be remembered that tuberculosis is just another of those social diseases coming within the range of the public health authority, and as he is compelled to look at the health problem as it affects the national life, tuberculosis is but one of the list, and anything that tends to elevate the standards of public health and welfare automatically contributes its share to the solution of the problem of the disease we are discussing. To look at tuberculosis from the point of view of its care and after-care is but to look at some phases of it. The preventive side, which is the public's contribution to its alleviation and subsequent eradication, is even more important. To achieve this ideal may necessitate methods little short of drastic, but to associate an impure milk with consumption is valuable, because it inculcates care in those who consume it and lays the foundation of not only making them health-conscious for this disease, but for every other of a preventive character in like proportion. A pure milk supply is not only a necessity in human welfare, but may be the means of teaching appropriate object-lessons of inestimable value, and it will be something of an achievement for the public that its most widely consumed commodity is disease-free, and we will be able to observe directly and indirectly society's own reaction and contribution, apart from that which is purely medical, to the control of this and other preventive diseases.

It is increasingly difficult to disassociate one problem from the other in public health. We as medical men have for long years known the intimacy of one disease to the other, and how often tuberculosis has followed in the wake of a previous infectious disease. It appears to me that a competent body such as is here assembled might lose a golden opportunity if tuberculosis is discussed merely as an entity and lose sight of it as a curable disease in the wider problem of the raising of the standard of the nation's general health. All we are about to do is to discuss it from one end—

i.e., from the point of view of the infected. Why not as well from the other end—as to ways and means of preventing it?

I regret that the hour does not permit me to indulge in savage talk upon milk supplies in relation to public health. Being a surgeon I have had considerable practical experience of these dangers, but I have let fall my brick, and I hope it does not drop sufficiently heavy upon anyone to do them harm.

I live in a State where people are rather inclined to think a little more radically than they ought to think at this juncture, and there is a growing opinion, too, among the younger section of medical men, who are associating social disease with politics—not a very difficult proposition in these days. They are turning their minds to the question of these social diseases, which have a direct relationship to industry and finance generally, and I think that most medical men will agree that the problem of tuberculosis has a direct relationship to social circumstances. When it is considered that in these political systems which operate at the present time nine-tenths of the people live at the bread-line and one-tenth live in affluence, and that from the nine-tenths we get the great bulk of our diseases, the time has arrived when we shall have to turn our attention to the political side of disease. It is stretching your imagination a little, I know, but it is a question which we shall have to consider in the future, that people who are living just at the bread-line, with just enough to maintain body and soul together, should be allowed to continue in that condition. If we correct that state of affairs I, personally, am convinced that the moment we get people to the point of living properly we shall see an enormous reduction in the incidence of disease.

Then some of you will consider this as part of my distorted imagination: one of the most extraordinary things is that the good Lord in His unspeakable wisdom gives us sunshine and chlorophyll and other things that science talks about, and yet when the sun appears man hides himself, and when it disappears he comes out into the open again; and the sooner that civilised society arranges matters so that man can work at night and love and laugh by day, the better for humanity. I know that is frightfully distorted, but Sir Pendrill has a tendency that way. He puts his people in the sun, and then society comes along and shoves his people back into dungeons and behind bars and in dark rooms—and that is what we call civilisation.

I am not going to discuss that with you at this juncture, but it is a problem of the future—the financial side, the political side, the social side, the industrial side—and I think from that remark it can be seen that a controversy could be started, which would last here for several weeks, on

whether we should be shoved behind brick walls at nine o'clock in the morning. However, I only want to show you that even in the remote portions of the Empire people are inclined to think of these problems.

I would like to express my deep appreciation of the spirit that actuated the calling together of an Empire Conference on the Care and After-care of the Tuberculous. I know of no subject that demands more earnest attention. I would like to express my appreciation of the honour done to me by allowing me to address you upon this subject, and if this paper lacks experience and controversial matter, for which I must apologise, the subject at least has my deepest interest, and alongside of all of you I am prepared to range myself with the utmost enthusiasm in the campaign you are undertaking, to attempt to control, and if possible eradicate, a disease that has too long been an obstruction to social progress, and a scourge that has beset the race, taking consistently its share of human life since the advent of civilised man.

THE TUBERCULOSIS OF THE NATIVES OF TANGANYIKA TERRITORY

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The statements I am to make are the result of a five-year investigation of tuberculosis, conducted by me in Tanganyika Territory at the instigation of the Director of Medical Services and the Colonial Office. They are incomplete partly because the difficulty in collecting reliable information in a native country is considerably greater than here in England. For instance, except in a few of the larger towns, no death-rate figures are available, and of the five million native population, a large proportion of those who die do so without having been treated by a qualified medical practitioner.

Tanganyika Territory lies just south of the equator, and is bounded by Kenya and Uganda on the north, the Belgian Congo on the west, Nyasaland, Northern Rhodesia, and Portuguese East Africa on the south, and the Indian Ocean on the east. It is a tropical country which consists of a coastal plain, a central plain rising gradually to 4,000 feet or more, and highland country, either rolling downs of 5,000 to 7,000 feet, or massive mountains, some of which are extinct volcanoes. Kilimanjaro, the highest

mountain in Africa, almost 20,000 feet, lies in the Northern Province. Lakes Victoria, Tanganyika, and Nyasa form part of the boundaries.

In this territory live about five million natives, mostly of Bantu origin, with a sprinkling of Arabs on the coast, and a considerable number of Hamitic Masai inland. The population is not evenly spread. Large tracts are uninhabited, partly on account of the unfertility of the land and partly because large areas are infested with tsetse fly and are therefore dangerous on account of sleeping sickness. The density of the population varies from over 400 per square mile to less than 7 in the inhabited areas. The pursuits of these natives are largely agricultural and pastoral, and the conditions under which they live are primitive. These conditions, however, are changing rapidly under the influence of education. Throughout the country Government and Mission schools and hospitals are widespread, with Europeans at the important centres, and native teachers, dispensers, and dressers in the tribal areas. These teachers and dispensers and tribal dressers have received training at recognised institutions.

There is now considerable traffic through the country. Railways exist, and motor roads penetrate to most parts. Natives frequently seek employment far from their homes, either in the goldfields or on the larger sisal, coffee, or sugar plantations. The Masai are nomadic, and other cattle-owning tribes travel far to sell their animals for food. Such journeys are done by men; women stay at home. Natives of the same tribe, although as a rule their houses are scattered, meet frequently at market-places or tribal headquarters.

Contact with outside civilisation has been close on the coast for centuries, and in certain places on the old slave routes to the interior it has been present, but the majority of the country was unknown until Livingstone explored it. Yet, though I have travelled in some fairly remote parts of this territory, in no place I have visited have I failed to find tuberculosis.

Tuberculosis, however, is by no means evenly distributed. Reports from Government hospitals since 1919 have indicated that certain districts produced more cases than others, the heaviest being the coast, the northern mountains, and the land bordering two of the great lakes. These are the areas of densest population.

As an aid in discovering what parts of the territory were most affected by tuberculosis, it was decided that I should make a tuberculin survey, and for this purpose I selected representative areas on the coast, the mountains and highlands, the plains, and round the lakes.

I used the Mantoux technique throughout, and for the majority of the tests I gave 0·1 c.c. of 1 in 1,000 Old Tuberculin (T) obtained, in different batches, from Messrs. Burroughs and Wellcome. I could not get completely

unselected people, and my method was to go to a native dresser's station or to a mission, and send news to the chief that a European doctor was willing to examine and treat all comers, but was especially interested in chests. I took drugs and assistants, and examined as many as possible of those natives who arrived. The examination was made with a stethoscope, a tuberculin test was done, sputum collected if desired, and, where possible, an X-ray examination of suspected cases was made with a portable machine. In 9,866 such examinations I found 114 cases of definite tuberculous disease, a crude rate of 11·55 per 1,000. I do not claim, of course, that this is the actual rate of the incidence of tuberculosis in these people, and my reason for explaining the method of persuading natives to come to me is to show that those examined were not completely unselected. In defence of this method I should make it clear that to get large numbers of unselected people in Tanganyika Territory is almost, if not quite, impossible, and to turn out whole villages for compulsory examination would not only be bad policy but would certainly fail in its object. Natives like the police, the King's African Rifles, or schoolchildren, are much more selected than those I saw.

In view of the fact that this crude rate of 11·55 per 1,000 included natives from those areas where tuberculosis is least common as well as from those where it is more so, I think the figure may not be too high for the more infected areas.

The natives tested in this manner were instructed to return after forty-eight hours for the reading of the test. Many of them did not do so, but about two-thirds did. I should say here that the results in these two-thirds were so similar to those obtained in the testing of groups (of labourers, police, or schoolchildren) the whole of which returned for reading, that I am convinced that those who did return represented fairly accurately the proportion of positive reactors in the whole community. That is, I do not think that those people whose reactions were positive tended to return for the reading of the test more than those whose reactions were negative. Treatment for other illness was given, if necessary, at the same time as the tests were made.

The reading of the test in a black skin is a little different from that in a white skin owing to the fact that erythema cannot be detected in the former. No test was considered positive unless there was palpable thickening of the skin of at least one quarter of an inch in diameter. If there was any doubt as to whether a reaction was positive or negative, it was counted as negative. Suspected or definite cases of tuberculosis were noted separately, and were not counted in the general population. As each result was written down, a rapid estimate of the age of the person

was made, and the results have been grouped under five age-groups for both sexes, which are:

0-5	representing	infancy and childhood.
6-15	,,	youth.
16-25	,,	young adult life.
26-50	,,	full ,, ,,
Over 50	,,	old age.

I think these estimations were fairly accurate. It would have been misleading to include all ages in one table and calculate a percentage, since that percentage would have depended on the relative numbers of young and old tested. Of these age-groups, that of 26-50 contained the largest numbers tested, and is the most accurate for comparisons between the different districts.

The first fact arising from a consideration of the 11,793 tests performed in this investigation was that in every place 50 per cent. or more of the adult population were positive to tuberculin. The rates in children were lower, and males were usually slightly higher than females. These natives cannot therefore be regarded as virgin soil. Much higher rates were found in some districts, notably in the northern mountains and on the coast, which each showed 83 per cent. positive in adult males and females combined. That rate is not much below the rates found in Europe and America. The districts round the great lakes showed 70 per cent. positives near Lake Nyasa, and 66 per cent. near Lake Victoria. The central plain showed the lowest figures.

The second fact observed was that the highest percentages of positive reactors occurred in those districts in which the greatest numbers of cases of tuberculous disease had been reported for years previously, which is what one would expect, except that it was not quite certain that the larger numbers were not due to the larger general hospitals that had been built in those districts, and to the shorter communications which existed in those areas. In my examinations I found higher proportions of definite cases of tuberculosis in those areas with high tuberculin rates than elsewhere.

The third fact observed was that the higher tuberculin rates were found in those districts in which the population was most dense.

As the results of the tests were written down in the individual cases, the sizes of the reactions were noted also and an average taken for each place. Similarly, the numbers of the tests which resulted in vesiculation were noted. From these results other facts were observed:

The fourth fact was that, in general, and with exceptions in those places where not many of the general populatiom were tested, the largest average

sizes and the greatest number of vesiculations occurred in those districts which showed the greatest percentages of positive reactors to tuberculin, and the smallest sizes in those districts where the tuberculin rates were the lowest.

The fifth fact was that in a district where the tuberculin-rate was almost equal to that in Britain, the sizes of the reactions were very nearly the same as those recorded by Professor Cummins (1929). In this comparison, however, I am not sure that had erythema been visible in these black skins, the sizes would not have been found to be greater than was thought.

The sixth fact was that compared with the population tested and the numbers of positives found, the numbers showing vesiculation were almost three times as many as those recorded by D'Arcy Hart (1932). This supports the finding of the South African Institute for Medical Research (1932), that the natives are, in general, more sensitive to tuberculin than the white races.

The seventh fact shown by these tuberculin tests is that although a considerable proportion of the natives are infected, comparatively few (though perhaps not so few as in Europe) are diseased, and that therefore the majority can control their infections.

These facts refer to the general, apparently healthy population. It is instructive to consider the contacts of cases of tuberculosis. I took X-ray films of 106 unselected contacts recently, and found that 16 per cent. showed definite tuberculous infiltration of the lungs, not including those who showed only isolated nodules or enlarged mediastinal glands. In a larger series of contacts who were tested with tuberculin I found 83 per cent. *of all ages* to be positive, and some were contacts of non-pulmonary cases. The sizes of the reactions were large, and vesiculation was far more common than in any other group except the cases of definite non-pulmonary tuberculosis.

As regards Tanganyika Territory, then, it can be stated that in those communities where opportunity for contact is likely to be greatest (that is, in the most densely populated areas, or in the families of tuberculous persons) we find: first, the highest percentages of positive reactors to tuberculin; second, the strongest reactions; and third, the greatest numbers and proportions of recorded cases of actual disease. Similarly, in the places where contact is least, the findings are low under all those heads. Places where contact is intermediate show intermediate results.

It seems logical, therefore, to think that continuous exposure to exogenous reinfection tends to produce, first sensitivity, then hypersensitivity, and finally disease, and if the highly allergic state is rather harmful than

protective, as is the view of Rich and others (1929), then the process may be a continuous one, and the dominating factor is contact. If these natives are in general more sensitive to tuberculin than the white races, then, on that reasoning, the outlook for them is so much the worse.

To revert for a moment to the subject of allergy in tuberculosis, Professor Cummins (1934) has described three phases: indifference, intolerance, and tolerance. It is exceedingly interesting to note that Doctors D. B. and M. E. Wilson, as a result of their work on malaria in Tanganyika Territory and India, explain the different responses to infection by malaria by three states of allergy and immunity which may be closely compared with Professor Cummins's indifference, active intolerance, and positive tolerance. The three states of malaria are: first, the insensitive and non-immune, before infection takes place; second, the hypersensitive and partially immune; and third, the desensitised and fully immune. There are differences between the two diseases. For instance, in the African natives desensitisation in tuberculosis rarely occurs except where the tuberculosis is so extensive that the patient's resistance is swamped. But in spite of the fact that the analogy cannot be too closely pressed, it is still possible.

Factors other than contact appear to be less important in determining the extent of infection and disease. The climate of the coast, for instance, is very different from that of the mountains. The former is hot and steamy, with good rainfall and small variations of temperature; the latter is cold and damp at night and in the cool season, with marked daily and seasonal variations of temperature. Except that in each case the climate encourages settlement and therefore close contact, it is difficult to see a connection between it and tuberculosis. The two principal diseases of natives—malaria and ankylostomiasis—are common on the coast but uncommon in the mountains, yet tuberculosis occurs about equally in both. I do not mean that these diseases do not influence the course of the disease in individual cases, but they seem to have little epidemiological effect.

Of the incidence of tuberculous disease in the natives it is difficult to give accurate figures. I have quoted the 11·55 per 1,000 found by me. This is not an annual rate. It includes those cases found at one examination. In 1928 I made a crude calculation in Dar es Salaam, the capital of the country, a town of about 22,000 native inhabitants, which showed that the death-rate from tuberculosis in 1927 was almost three times as great as in England. This is probably true of other places where contact is close. It is my impression that tuberculosis is a serious disease, and that it is probably increasing in the territory. It seems that the main incidence falls between the ages of fifteen and thirty-five in pulmonary cases, and earlier in non-pulmonary cases.

Nine hundred and eleven pulmonary and 131 non-pulmonary cases were found during the investigation. The proportion is probably correct.

Two hundred and fifty cases of pulmonary tuberculosis were examined radiologically. Using a portable machine for which the current was supplied by a generator activated by the back wheel of a car, it was impossible for me to use the fluoroscope, since I dared not trust the control of the car to a native driver who might, not understanding the mechanism, have destroyed the tube. I therefore took films. A number were spoiled because the natives, though they like X-ray examination, become excited and move during the exposure. Only the satisfactory films are here considered.

These 250 films all showed tuberculous infiltration; 32 per cent. were unilateral, the rest bilateral. A fairly common picture was infiltration in the upper part of the right lung with a fan-shaped spread in the middle of the left lung.

Cavitation was seen in 44 per cent. The cavities were frequently multiple and did not often show signs of surrounding fibrosis. Miliary tuberculosis was seen in 21 per cent.

Evidence of fibrosis was seen in the displacement of the trachea in 25 per cent., and in the lung-fields in a further 10 per cent. of these films. In 26 per cent. calcified nodules were seen in addition to the tuberculous infiltration, indicating the partial or complete healing of the primary focus. Enlarged mediastinal glands associated with definite pulmonary infiltration were seen in 18 per cent. of the patients. This seems to indicate that first infection progressed quickly to recognisable disease. Suspicious glands occurred with infiltration in a similar number of cases.

One hundred and six contacts were examined radiologically, chest films only being taken. Of these 16 per cent. showed definite tuberculous infiltration, and, in all, 57 per cent. showed definite evidence of infection. This is not so high as the figures for the tuberculin tests in contacts, but large areas, of course, of the lungs are not visible on films. The tuberculin figures are accurate.

The common type of pulmonary tuberculosis was more like the acute type seen in England than the chronic fibrous type. Sometimes massive infiltration was seen. Unfortunately, the natives, in their present state of understanding of pulmonary tuberculosis, tend to appear for examination at a rather late stage of the disease. Earlier infiltrations can be detected in contacts examined at request, and it is perhaps on such lines that diagnosis at a stage early enough to be of the greatest value can most easily be made. X-ray, of course, invariably shows more extensive lesions than physical signs indicate. Perhaps, in dealing with the general non-contact population, the most satisfactory method is to examine the sputum of every person

complaining of a cough which has lasted more than three weeks, and if it continues, to perform a radiological examination. Tuberculin testing may be used, and persons with strong reactions should be observed. A strong reaction is fairly good evidence of contact. For instance, at one place I tested thirty schoolgirls, of whom fifteen were positive. The average size of their reaction was 22 millimetres, and eight of them showed results of 25 millimetres (1 inch) or more, four with vesiculation. No explanation of these severe reactions could be found at the time, but I heard later that one girl, who had left the school shortly before my visit, had since been found to be suffering from pulmonary tuberculosis with a positive sputum. Similarly, on finding strong reactions in children, I have several times found that one parent, on being sent for, has been an open case of pulmonary tuberculosis.

The type of tubercle bacillus responsible for the great majority of cases of tuberculosis in Tanganyika Territory is the human type. The evidence for this statement is chiefly that tuberculosis of cattle is rarely reported by the veterinary department. On Kilimanjaro, a few years ago, Cornell (1934) tested 441 animals by the double intradermal method. Only 8 were positive, and of these 4 were slaughtered, the results being completely negative; 1 doubtful reactor was also slaughtered, but was negative. On the other hand, cases are being reported in an area which comprises part of the central plain and the southern highlands, but that they are having little effect on man is shown by the fact that in that area the tuberculin rates in children are low. There probably exist, however, human cases infected with bovine bacilli, but the numbers are probably small. I have cultivated two strains of tubercle bacilli derived from the organs of cattle. Their cultural characteristics were typically bovine. Sixty-eight strains which culturally were of the human type were isolated, sixty-seven from sputum and one from spinal abscess.

I have found living tubercle bacilli in the dust from near the beds of sputum-positive cases in Tanganyika Territory. The natives spit on the floor at night, and the dust is frequently disturbed. With that and with the droplet infection which must take place in the huts, where whole families sleep in one room along with their cattle and goats, it is impossible for contacts to avoid frequent and heavy infection. A native sputum, if positive, is usually loaded with bacilli.

Conclusions.

1. Tuberculosis is present throughout Tanganyika Territory, and the natives, as a whole, cannot be regarded as virgin soil. Some places are only moderately infected, others are almost as heavily infected as England.

2. The most heavily infected places, and the places in which the largest numbers of definite cases of disease are found, are those places where the population is most dense.

3. The highest tuberculin rates, and the heaviest incidence of disease, occur in the family contacts of sputum-positive cases. The conclusion from these two paragraphs is that contact is the dominating factor. The corollary is that the control of sputum-positive cases and the care of contacts are two of the main lines on which control of the disease must be based. In England Sir Pendrill Varrier-Jones and his staff at Papworth, and others elsewhere, have shown how this may be accomplished. In Africa the position is more difficult, but the task is being attempted. Force cannot be used successfully in the isolation of infectious cases, and the best results will come from education and example. Dr. Lissant Cox yesterday emphasised the value of education in England.

4. Treatment of diseased cases must accompany education. In Tanganyika Territory, artificial pneumothorax treatment is now available at several hospitals, where it is being carried out by Government and mission doctors.

5. Tuberculosis is probably spreading among the natives. This is not only my opinion but also that of certain missionary Sisters and doctors who have been in the same districts for many years. I regard that as good evidence.

6. Tuberculosis, in the list of causes of death in the territory, usually occupies fourth place. This is high.

7. Bovine tuberculosis is rare at present, but will probably increase.

8. The more the natives seek employment on goldfields or large plantations, the more is tuberculosis likely to spread.

9. The prognosis in native tuberculosis cases is usually bad. This may be due to late diagnosis, poor living conditions and diet, or possibly to a racial predisposition to the disease, perhaps increased by concurrent diseases. With better conditions and treatment, an improvement may be looked for. The natives, in that many of them are infected and resist that infection, show that under most circumstances they can control infection. It may take very little to increase that capacity for control so that a repetition of the experience of the North American Indians may be avoided.

I am indebted to the Director of Medical Services, Tanganyika Territory, for permission to read this paper.

THE INDIAN PEOPLE AND TUBERCULOSIS

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Our main knowledge of the present incidence of tuberculosis in India rests on general observations, such as that of Lankester in 1920.[1]

Sir John Megaw states[2] that there are probably over 2,000,000 cases of tuberculosis in India. One of his conclusions is that " tuberculosis is well known to be exceedingly prevalent in the cities and large towns, but little is known as to its incidence in rural areas," although he states that it is evidently very widespread throughout the villages.

In the large cities mortality-rates from tuberculosis as given in official figures vary from 140 to 256 per 100,000 population, as compared with 100 to 120 for some of the large towns of England. But these figures for India are probably far below the real ones. A recent investigation[3] carried out in part of Lahore has shown that only 50 per cent. of the deaths from tuberculosis were actually reported as such, the other 50 per cent. being included under fevers and other diseases.

Cummins says[4] of tuberculin that " its use in mapping out the intensity of infection in native populations is incomparably great."

Ukil (1930) gives figures[5] for a tuberculin survey of 6,500 individuals, very predominantly urban and jail population.

According to him a positive von Pirquet test was obtained in from 11 per cent. in those of five years and under to 75 per cent. in those of sixty years and over. He also shows that the figures for rural areas are much less than for urban, and that the positives increase as the conditions approach the urban.

A tuberculin survey was recently carried out by the Union Mission Tuberculosis Sanatorium, Arogyavaram, Madanapalle, in the Madanapalle subdivision of the Chittoor District. This area is 160 miles west-north-west of Madras, and 80 miles east of Bangalore. In the survey were included two taluk headquarters—small towns of about 10,000 and 4,000 inhabitants—two large villages with conditions approximating to the urban type, and a number of small villages varying from 50 to 300 inhabitants. In some of the villages the whole population was tested. In addition, the

survey included four schools in Madanapalle, two with hostels for children coming from the villages.

In this subdivision the population lives comparatively isolated, and many of the inhabitants in the smaller villages examined have never seen a train and only recently a motor-car.

The test was done without any selection in the towns and villages, for all ages and for both sexes. From the social and economic point of view all classes have been included in all the communities—Hindu, Christian, and Muslim.

The technique used for the tuberculin test was that of von Pirquet, with a scarification of the skin of the forearm, half an inch long. All readings were taken after forty-eight hours, and the intensity of the reaction was noted under different heads. A positive was counted when there was palpable œdema and redness of a width of more than 2 millimetres. When the width was from 3-5 millimetres a reading was recorded as +, of from 5-10 millimetres as + +, of over 10 millimetres as + + +. The tuberculin employed was Burroughs and Wellcome, Old Tuberculin, human (T).

Although we realise that the Mantoux intradermal test is the ideal test in such surveys, it is impossible to use a test involving an injection, however small, in a population such as that with which we had to deal; it was absolutely refused, and doors were shut until it was certain by demonstration that no injection was to be given.

In the African survey, reviewed by Professor Cummins,[4] it is stated, " the von Pirquet test is roughly comparable to the intradermal test with a 1 in 5,000 dilution," the strongest dilution used in that survey.

The total number tested in the survey was 3,015, made up as follows: Hindus, 2,010; Indian Christians, 605; Muslims, 370.

We find that children under fifteen show 12·5 per cent. positive in the towns and 9·4 per cent. in the villages, while adults show 45·4 per cent. in the towns and 34·7 per cent. in the villages.

The detailed figures for this survey are given in Table I., p. 234.

In dividing the total number investigated into different communities, we find that there is very little difference between the Hindu and Indian Christian groups, but a marked difference is found in the Muslim group, both in towns and villages, children and adults, the percentage of positives being about double that in the other groups.

When the figures are analysed with regard to occupation, we find the most heavily infected naturally those who attend on the patients—doctors, nurses, and ward attendants; next come those engaged in indoor occupations, such as clerks, merchants, tailors, goldsmiths, and cigarette makers; the group with the lowest percentage is, as might be expected, those engaged

in agricultural work. The highest group, apart from those in direct contact with the patients, is that of the police. Of the 200 children below five years of age, only 6 per cent. were found to be positive.

TABLE I.

TUBERCULIN SURVEY OF 3,015 INDIVIDUALS.

Community.	Total.						Towns.						Villages.					
	Adults.			Children.			Adults.			Children.			Adults.			Children.		
	Number.	Positives.	Per Cent.	Number.	Positives.	Per Cent.	Number.	Positives.	Per Cent.	Number.	Positives.	Per Cent.	Number.	Positives.	Per Cent.	Number.	Positives.	Per Cent.
Hindus..	1,056	403	38·16	941	89	9·46	609	263	43·21	556	63	11·33	447	140	31·32	385	26	6·75
Indian Christians	172	59	34·30	332	35	10·54	76	27	35·53	142	15	10·56	96	32	33·33	190	20	10·53
Muslims..	199	123	63·73	152	34	22·37	154	91	59·10	96	21	21·88	45	32	71·10	56	13	23·21
Total ..	1,427	585	40·29	1,425	158	11·09	839	381	45·42	794	99	12·47	588	204	34·69	631	59	9·35

NOTE.—163 individuals, in contact with patients in the tuberculosis wards, omitted in this Table.

It is evident from these figures that from the point of view of epidemiology, the villages in the area surveyed are no longer virgin soil in the commonly accepted sense of the word, and yet the area is comparatively isolated and sparsely populated, and with one of the best climates in South India.

A further help in finding out the incidence of tuberculosis is by examination of contacts of tuberculous patients.

It has been impossible for us to carry out examination of contacts as our patients come from all over India and Burma.

A recent report, not yet published, by Dr. Vasudeva Rao, Director of the Government Tuberculosis Institute, Madras, under the auspices of the Red Cross Tuberculosis Committee, which I have the Committee's permission to quote, shows that the incidence of tuberculosis among the contacts of tuberculous patients seems to be exceedingly high. Of 2,620 contacts of patients with positive sputum who were examined, 882, or 32·79 per cent., were found to have tuberculosis in some form or other.

Types of Pulmonary Tuberculosis in Different Races outside India.

It is now well recognised that the type of tuberculosis is different in Africans, and in the negroes in the United States, both pathologically and clinically, from the type found in the white races. Professor Cummins has shown[4] that there is an extreme susceptibility to tuberculous infection in the African natives when they are removed from their accustomed surroundings and brought into a new environment involving contact with tuberculous infection. They then develop a type of disease which is similar to that seen in children in Europe, showing an inborn lack of power to develop the resistance to tuberculous lesions commonly observed in European adults.

Several American investigators, among whom are Opie,[6] Pinner and Kasper,[7] and McCain,[8] have come to an almost similar conclusion with regard to Jamaicans and American negroes.

There is a greater tendency to massive exudative lesions in the lungs, a greater tendency to dissemination, less tendency to fibrosis, less tendency to periods of quiescence and temporary improvement, in the negro as compared with the white. The chronic apical lesion of the white is rare in the negro.

On the other hand, it may be, as is suggested by Opie and others, that the reason for the difference in type of tuberculosis is not entirely one of racial susceptibility, but is also partly due to the mode of infection arising out of environmental factors.

Types in Patients in India.

In examining the patients in the sanatorium at Arogyavaram, we were struck with the large number showing a predominantly exudative type of tuberculosis with a marked tendency to dissemination and very little tendency to fibrosis or localisation. This was specially noted when the possibility of thoracoplasty had to be considered in individual patients. Consequently we have made a special study of 2,045 consecutive patients admitted since 1930, of whom we had X-ray films. These patients were all considered to be suffering from tuberculosis in first, second, and third stages, the non-tubercular being omitted. The patients came from all parts of India, and from different communities. We have excluded from detailed analysis 130 patients, of whom 18 were suffering mainly from intestinal or abdominal tuberculosis, 7 from glandular, and 3 from bone tuberculosis, and 102 in whom no changes in the lungs (except calcification of primary foci in 30) could be detected by X-ray, although of this last group 7 had a positive sputum.

Of the 1,915 patients considered in detail, Hindus numbered 959, Indian Christians 617, and Muslims 186; in addition there were 40

Europeans, 84 Anglo-Indians, and a miscellaneous group of 29, mostly Burmans.

The results of the study were not materially different in the different Indian communities, nor in men and women of these communities considered separately, except that the women showed a slightly higher percentage having exudative type of disease with less fibrosis. Therefore we have grouped the figures for all Indian patients together, making a total of 1,762 Indian patients. In these we find that only 99 patients, or 5·6 per cent., showed any marked tendency to fibrosis, while 1,632, or 92·6 per cent., were predominantly exudative; 31, or 1·8 per cent., showed involvement of the pleura only. Previously healed lesions were found in only 289, or 16·4 per cent. Again, only 332, or 18·8 per cent., showed any tendency to localisation, and 734, or 41·7 per cent., showed marked dissemination (Table II.).

TABLE II.

ANALYSIS IN PERCENTAGE OF FINDINGS IN 1,886 INDIAN, ANGLO-INDIAN AND EUROPEAN PATIENTS.

	Indians.	*Anglo-Indians.*	*Europeans.*
Number	1,762	84	40
Fibrotic	5·6	11·9	40·0
Exudative	92·6	80·2	60·0
Pleurisy	1·8	1·1	0·0
Previously healed lesions	16·4	29·8	45·0
Acute-initial (1-24 months)	76·7	72·6	67·5
Chronic-recrudescent	23·3	27·4	32·5
Localised	18·8	22·6	55·0
Moderately disseminated	39·5	46·4	37·5
Markedly disseminated	41·7	30·9	35·0
Unilateral	29·6	22·6	45·0
Bilateral	70·4	77·4	55·0
With cavities	72·1	65·5	45·0
Cavities with soft walls	93·1	80·0	55·5
Cavities with moderately hard walls ..	6·9	20·0	44·5
With single cavity	49·9	52·7	72·2
With two or three cavities	24·9	21·8	16·7
With multiple cavities	25·2	25·5	11·1
Activity of disease shown by Schilling count and sedimentation-rate:			
Low	9·8	14·9	20·0
Moderately high	19·8	17·9	44·0
High	70·4	67·2	36·0

Unilateral disease was found in only 521, or 29·6 per cent., and 1,269, or 72·1 per cent., showed cavities, half of this number showing multiple cavities. X-ray showed only 87, or 6·9 per cent., of the cavities to have moderately hard walls; 1,182, or 93·1 per cent., showing soft walls.

If we group the patients according to Professor Cummins's classification of " acute-initial " and " chronic-recrudescent," we find that as many as 1,352, or 76·7 per cent., come in the acute-initial group, and only 410, or 23·3 per cent., in the chronic-recrudescent. High blood activity, judged by the Schilling differential count and the sedimentation-rate, was shown in 70·4 per cent. of the patients, and low blood activity in only 9·8 per cent. Most of the patients showed sub-apical and middle-zone affections, very few purely apical.

In contrast to this may be placed the figures for the small group of European patients; of these, as many as 20, or 40 per cent., showed a tendency to fibrosis, as compared with the 5·6 per cent. of Indian patients; 22, or 55 per cent., showed localisation, and 18, or 45 per cent., signs of previously healed disease, as compared with 18·8 per cent. and 16·4 per cent. among the Indian patients.

The figures for the Anglo-Indian patients indicate a type of tuberculous change in the lungs in between that of the Indians and Europeans.

An important question in the problem of tuberculosis in India naturally arises as to whether there is any difference in the type of disease as found in patients coming from the cities, those coming from the villages, and those who really belong to villages, but who have developed active tuberculosis after going to live in a city or town.

Among the 1,762 Indian patients whom we have surveyed in this investigation, we have studied this problem in 1,731 (Table III., p. 238).

The patients have been divided into groups according to whether they came from cities and large towns, from small towns, or from villages; we have also grouped separately those who have gone from a village to live in a town, and those from the Malabar coast. This last group is taken separately because the density of population and housing and social conditions make the whole area really semi-urban from the point of view of this investigation. The type of disease is practically the same in all the groups, whether they be from the city or village. But there will, however, be found a tendency to a beginning tuberculisation of the cities and towns, as indicated by a slightly higher percentage of healed lesions, unilateral affections and localisation in those who live in the city and town, as compared with those living in the village. Almost all the figures in the table show that with increasing urban conditions there is a tendency to a milder type of the disease.

TABLE III.

ENVIRONMENT AND TYPE OF TUBERCULOSIS.

	Number of Patients.	Acute-Initial, 1 to 24 Months.		Chronic-Recrudescent, over 2 Years.		Previously Healed Lesions.		Unilateral.		Bilateral.		Localised.		Moderately Disseminated.		Markedly Disseminated.		Fibrotic.		Exudative.	
		No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Cities and large towns ..	356	275	77·2	81	22·8	68	19·1	120	33·7	236	66·3	77	21·6	157	44·1	122	34·3	22	6·2	334	93·8
Small towns ..	410	315	76·8	95	23·2	74	18·0	115	28·0	295	72·0	69	16·8	180	43·9	161	39·3	24	5·8	386	94·2
Malabar coast	438	321	73·2	117	26·8	64	14·6	120	27·5	318	72·5	78	17·8	176	40·3	184	41·9	23	5·3	415	94·7
Villages to towns ..	259	203	78·3	56	21·7	36	13·9	65	25·3	194	74·7	36	13·9	100	38·6	123	47·5	16	6·1	243	93·9
Villages ..	268	214	79·9	54	20·1	31	11·6	61	22·8	207	77·2	42	15·7	90	33·6	136	50·7	14	5·2	254	94·8

In order to see if the economic status of the patients had any influence on the type of tuberculosis, we divided our patients into three groups—poor, middle-class, and well-to-do—the numbers in these groups being: 731 poor, 846 middle-class, and 185 well-to-do. We have studied these groups (Table IV.) with regard to the same points as in the previous analysis.

TABLE IV.

ECONOMIC STATUS AND TYPE OF TUBERCULOSIS.

	Number of Patients.	Acute-Initial, 1 to 24 Months.		Chronic Recrudescent, over 2 years.		Previously healed Lesions.		Unilateral.		Bilateral.		Localised.		Moderately Disseminated.		Markedly Disseminated.		Fibrotic.		Exudative.		Pleurisy.
		No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.
Poor ..	731	538	73·6	193	26·4	100	13·7	183	25·0	548	75·0	128	17·5	275	37·6	328	44·9	44	6·0	676	92·5	11
Middle class ..	846	650	76·7	196	23·3	149	17·6	258	30·5	588	69·5	157	18·3	341	40·1	348	40·9	48	5·7	782	92·4	16
Well-to-do	185	143	77·3	42	22·7	42	22·7	75	40·5	110	59·5	39	21·1	90	48·6	56	30·3	7	3·7	174	94·1	4

We find that there is very little difference in the different groups, except that the well-to-do, who chiefly lived in cities and towns, while not having more fibrosis, yet in all other points showed an advance towards a less severe form of tuberculosis. Because the figures for the well-to-do group of patients are slightly above the average for the towns in which they live it looks as if their economic status had some influence on the type of their disease.

Conclusions.

Our tuberculin survey and review of the patients in the sanatorium are not large enough to form any basis for generalising about the whole of India. They do, however, support the general impression that the infection is widespread, even in the villages. The review certainly indicates that the type of the disease, as commonly met with in Indian patients, is of the acute, rapidly developing type. There is no evidence to show that community, economic status, or the influence of city or village life play a marked rôle in determining the type of the disease.

Although the infection is so widespread and the type so severe, we were surprised to find so little tuberculous disease in the area of the tuberculin survey. This is specially surprising when we consider the calculated high morbidity-rates for a city like Madras.

The question arises why we find so little disease in the investigated area. Here we are apparently met with a condition similar to that found by Professor Cummins among the Africans when he says,[9] "The African native, if he contracts tuberculosis during his contract, is almost certain to die of it after a very short period of illness, but the African native of the same race, in his own village, shows a well-marked tolerance of infection."

The question as to why we meet almost solely the one type of acute exudative, disseminated pulmonary tuberculosis may also be answered by a suggestion of Professor Cummins with regard to the Africans that it is due to auto-inoculation brought on by undue stress or unfavourable environment during a period of relative instability in tuberculous immunity, with a state of severe intolerance to tuberculo-proteids. The fact that 64·1 per cent. of our patients gave no history of contact with tuberculosis in the family or outside may be evidence in support of the auto-inoculation theory.

On the other hand, it may be that the main factor is a condition of life in which an individual is exposed to repeated, massive doses of tubercle bacilli from outside. As many as 35·9 per cent. of our patients gave a history of direct contact with tuberculous patients.

May it not be possible that both theories are true in producing separately or in combination the same end-result, the acute and severe type of pul-

monary tuberculosis? This needs further investigation because it has a direct bearing on the form of the campaign against the disease in India.

The factors which lead either to endogenous reinfection or to massive exogenous infection may apparently be found in the villages (as nearly 25 per cent. of our patients came from the villages) just as they are found in the cities and towns, and in the homes of the rich just as well as in the homes of the poor.

Why villages in one area should be widely infected but almost entirely free from tuberculous disease, as we have found in our area, while villages in another area should not only be widely infected but also have a high morbidity, is a problem the solution of which should lead to our finding means and methods of combating the disease effectively.

As the type of the disease is the same in town and village, the discovery of such a factor in the village might also have the greatest bearing on how to combat the disease in the city.

First, we suggest further research work through surveys in different areas, but completely co-ordinated under a single and scientific control.

Secondly, we suggest that the efforts against tuberculosis should not be wasted in a general broadcast type of propaganda, but should be concentrated and directed to reach those among whom the disease is actually found, and to educate them in tuberculosis control.

Thirdly, we suggest well-organised efforts for detection, treatment, and isolation of those who are a serious source of danger to others, as the type of the disease is so severe as shown, and who are themselves in need of speedy and efficient help.

The time has come in India for a complete reorganisation of the whole way of dealing with tuberculosis and to plan out a campaign which will reach the heart of the problems and not just touch the fringe.

I acknowledge with gratefulness the help of Dr. C. Frimodt-Möller, the Medical Superintendent, and of many members of the staff of the Sanatorium who have co-operated in this investigation and without whose help it would have been impossible.

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TUBERCULOSIS IN PALESTINE

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Such information as is available regarding tuberculosis in Palestine is from the results of a survey of this disease carried out amongst all sections of the population during 1934 and 1935. Previous to this survey, little was known regarding the incidence of the disease, apart from death notifications which were applicable in the towns and did not hold good in rural areas. Little also was known from the historical aspect except that Palestine's position on the main trade routes of the Near East and its rather extraordinary history of conquest and re-conquest must inevitably have led to contact with the disease from time immemorial. Tuberculous disease in its many manifestations has been detected in early Egyptian mummies; it was well known to the Greeks, and it is unlikely that Palestine escaped.

The extent and distribution of the infection, however, must have varied with wide limits in a country where there are so many different classes and communities, and it is probable that rural populations had little contact with the disease until recent years, when transport facilities, trade, and so on, have brought the villager into a much closer contact with urban life.

The nomadic Bedouin tribes had probably never more than a casual contact with the disease until recent years, when the march of civilisation has introduced the infection that usually accompanies such an invasion into a soil of low resistance.

These premises have been demonstrated during the survey to which I have referred, and the results of tuberculin sensitivity tests to which reference will be made shortly to some extent add confirmation.

Immunity.—Some observations were made on tuberculin sensitivity rates in school-children, ages five to thirteen (Mantoux 1/1000). Of 11,000 Arab school-children from town schools tested, 1,823, or 16·12 per cent., were positive. Of 3,660 village school-children, 483, or 13·2 per cent., were positive.

Hart's London figures (summarised in 1932) found 30·5 per cent. positive in a group of ages six to ten, and 57 per cent. positive in the eleven to fifteen age group.

Tattersall, in Leeds, found 68 per cent. positive in children of all age groups.

The age grouping is not exactly the same for comparative purposes, but the Palestine sensitivity rates are considerably less than half, and the rural groups in Palestine are considerably lower than the urban groups.

This is an interesting observation from an epidemiological point of view, and, as it is taken on a basis of 15,000 individuals, must be considered of some value.

The question then arises whether the process of tuberculisation is increasing or otherwise.

I think that from the experience of other countries, and from the fact that in Palestine many other factors favouring an increase in the incidence of tuberculosis exist, we must expect that an increase in the tuberculisation of the community may be anticipated.

Nutrition.—An attempt was made during the survey to carry out some observations on nutrition, with the following results:

The average diet of the Arab villager (approximately 600,000 of the population) is considerably below that generally considered necessary for normal requirements. At certain seasons dietetic deficiency may be acute. Many of the villagers are suffering from extreme degrees of malnutrition, have a low resistance to disease generally, and are incapable of sustained effort.

Jewish rural communities appear to consume a satisfactory diet, qualitatively and quantitatively. Regarding urban populations generally, the question would appear to be associated almost entirely with the prosperity of the groups concerned, and there is known to be considerable poverty amongst certain classes in the towns.

General Health Conditions.—The general health of all sections of the population has improved tremendously since the country came under British Administration, a fact which is definitely confirmed by a perusal of the reports of the Department of Health.

Malaria, highly endemic during the Turkish regime, is now well under control.

The enteric group still gives rise to some anxiety, but the principal epidemic diseases particularly affecting tuberculosis are the seasonal waves of whooping cough and measles, which take a heavy toll of the badly nourished village children and prepare the soil for tuberculosis in the survivors. Progress in health improvement can be confidently anticipated. Infant

welfare services and school medical services are being gradually increased and extended to embrace larger areas, while sanitation is improving rapidly both in towns and villages. The Jewish community, who run their own social services, adopt high standards with excellent results.

Housing, Sanitation, etc.—Unfortunately a large proportion of the population is living under conditions of overcrowding, even among better classes. Housing development in recent years has not kept pace with immigration, and conditions of overcrowding in certain towns are acute—as many as ten people may share one room.

The poorer Arab classes of the towns are invariably overcrowded, and the same remark applies to Yemenite Jews. The Arab villager, despite the fact that he spends most of the day in the open air, huddles together with his family and frequently his animals in a single room at night.

Sanitation is improving rapidly in the larger towns, sewerage schemes and water supplies being the order of the day. Village sanitation is making very slow progress, but there is progress.

Reaction to Tuberculosis.—The psychological reaction of the three main religious communities—Jews, Moslems, and Christians—is a factor of importance in tuberculosis in Palestine.

The Jews have a national consciousness of the disease, and know that measures can be taken to arrest it in the individual and reduce its incidence in the community. As a result, they have had for some years an organisation called the Tuberculosis League.

Moslems, with the exception of the town educated class, while recognising tuberculosis as a formidable disease, know practically nothing regarding its mode of production and infectivity. They adopt a fatalistic attitude to it and take no precautions regarding infection.

Christians recognise the disease and fear it. Their more educated classes seek advice and treatment. Its infectious nature is realised and, as a result, infected individuals in a Christian community are apt to conceal their condition for fear of being isolated from the rest.

Certain habits and customs are of interest in respect of tuberculosis. The Moslem woman of the towns leads a very confined life, frequently in overcrowded conditions. Inter-marriage and prolonged lactation are unsatisfactory factors of village life. A succession of pregnancies in adolescence may also be mentioned.

The Arab villager leads an exposed life in the hills during the winter months, when the elements are often severe. He is constantly at work in the field in heavy rains with insufficient clothing, returning to a damp, cold, cheerless house to spend the night in his wet garments. As a consequence, respiratory conditions are common, are invariably neglected,

and the subject of incipient tuberculosis has lost the battle before he realises the fight has commenced.

Death-rates.—Notification of deaths holds good only in the towns, and then is very unreliable. No system of notification exists in villages. Consequently we can only base our death-rates on the figures for the seventeen principal towns of Palestine.

The mean average death-rate for the five-year period 1930-34 was 516 per million, the pulmonary form accounting for 387, and the extra-pulmonary for 129, or about 25 per cent. of the total. The Moslem rate was greatest and increased from 507 in 1930 to 747 in 1934.

The crude death-rate for England and Wales for tuberculosis (all forms) in 1933 was 824. Regarding the incidence of tuberculosis, the figures have been worked out on a population coming under survey of about 895,633 (all races), and works out as a crude rate of 5,101 per million of the population. A crude rate, worked out from dispensary registers in England and Wales for 1933, is 5,216 per million.

Extra-pulmonary cases account for 22·5 per cent. of the total as compared with 26·8 of the England and Wales figures.

The rate per million for the various religious communities in towns varied as follows: Jews 3,969, Christians 3,630, Moslems 6,633.

From these death- and incidence-rates it will be seen that the disease reaches in Palestine an endemic importance equal to that experienced in England, and from observations already made on tuberculin sensitivity it is probable that the incidence is increasing.

A laboratory enquiry into the question of the extent of bovine infection, as compared with human, proved interesting.

Over 330 raw samples of milk were examined from all districts, of which only 1 proved positive. Of 234 specimens taken from human extra-pulmonary lesions 28 were found positive, of which 27 were human type and 1 bovine. These figures are perhaps too small to be of epidemiological value, but they certainly postulate the predominance of the human type of organism, and the statistics of the Chief Veterinary Officer show that there is practically no bovine T.B., certainly not among native-born cattle.

The results of the investigation may be briefly summarised as follows:

From the rather scanty historical information available, it would appear that the disease has been present for centuries. While, in the past, its effects were probably more or less confined to the large urban communities, the unparalleled rate of development in Palestine in recent years has deprived the rural communities of their original isolation and has permitted a gradual extension of the disease amongst them.

The data obtained from the results of the investigation, while they do

not show the total incidence of the disease, provide sufficient evidence that tuberculosis contributes to morbidity and mortality to a degree analogous to that in Western European countries.

Evidence has been produced that the incidence of the disease and mortality from it is greatest in the Moslem community.

An estimation of tuberculin sensitivity indicates that the Arab population (particularly the rural group) has not yet been tuberculised to the extent recorded for civilised European and American races; further, that the disease offers to child-life a rapidly growing risk as age advances as compared with the experience in England. It is considered inevitable that this process of tuberculisation will continue until a natural balance has been achieved. This may also apply in some degree to oriental Jews. The immigrant adult Jewish population is probably already tuberculised, and the amount of tuberculisation of its future generations will probably depend on environmental, social, and hygienic factors.

Since tuberculisation of a race cannot yet be obtained without morbidity and mortality, and since the conditions under which a considerable proportion of the population exists favour the production and spread of tuberculosis, an increase in the morbidity and mortality-rates from tuberculosis is to be anticipated. An increase in the Moslem mortality-rate from the disease has already been recorded during the last quinquennium.

Regarding Bedouin, a susceptible people with low resistance, living under depressed economic conditions, the above remarks apply even more forcibly.

TUBERCULOSIS AMONG NOMADIC BEDOUIN IN TRANSJORDAN

The tribes investigated were found to be suffering from poverty and consequent malnutrition. Their food supplies are insufficient in quantity and quality, and in many instances inadequate to support life.

Figures for tuberculosis are very high, about 16 per cent. being found affected in 1,000 people examined. The type of disease met with is frequently of the acute " galloping " variety.

Both individual and racial resistance appears low.

Recommendations :

1. *Palestine.*—Hospital, sanatorium, and tuberculosis dispensary service for the whole country.

2. *Bedouin of Transjordan.*—Schemes of relief temporary and piecemeal in their application merely confuse the main issue, which is to ensure that the tribes become self-supporting and permanently so. Without the practical application of this doctrine, medical and health measures merely prolong the agony.

SIXTH SESSION

CHAIRMAN: PROFESSOR LYLE CUMMINS,
C.B., C.M.G., M.D.

TUBERCULOSIS IN NEW ZEALAND, WITH SPECIAL REFERENCE TO THE MAORI RACE

BY BERNARD MYERS,
C.M.G., M.D., F.R.C.P.,
Representing the Government of New Zealand.

I THINK it would be well to begin by stating that in 1840 New Zealand was settled with people many of whom were of the public-school class, and that the same type is practically prevalent today throughout the Dominion—*i.e.*, a fine healthy stock mentally and physically.

The Maoris, who settled in New Zealand some six hundred years ago, came from some of the islands in the Pacific Ocean to the north of New Zealand. The Maoris are, without doubt, one of the finest coloured races in the world, both mentally and physically, and were, undoubtedly, when living in their native state, a healthy and virile race.

It may be taken for granted that the white population in New Zealand react to the tubercle bacillus somewhat similarly to the average Englishman in Great Britain, but the incidence of tuberculosis and the death-rate are less in the white population of the Dominion than occurs in England.

The method of treatment obtaining in New Zealand is much the same as in Great Britain—*i.e.*, after diagnosis, sufficient rest, good food, a certain amount of psychological treatment, and so far as necessary drugs, etc., are used for a specific purpose. The various procedures and surgical operations performed regularly in England to put a lung at rest are similarly done in the Dominion, so no further reference is needed in this respect.

The story is, however, somewhat different with the Maoris, who contract tuberculosis more easily than the New Zealanders of European descent. Not only so, but the Maori would appear to have a lessened resistance to the disease, and hence the death-rate is distinctly higher. Unfortunately, the hygienic conditions and sanitation under which the Maoris live do not

conduce to a speedy cure, and as they are reluctant to adopt the necessary European methods it has made the treatment and cure of tuberculosis among the Maoris a really difficult problem. The Maoris like segregation, and, living in close proximity to each other with regard to sleeping, feeding and ordinary social intercourse, spray infection and contact infection are likely to be only too prevalent amongst them. Added to this, the Maoris have not in the past adopted the same methods of washing their hands before touching food, eating, or drinking, as are usual with us. Another point to be noted is their method of greeting each other by rubbing noses—surely a source of great danger from the point of infection.

Statistics.—For the year 1930 the number of deaths from tuberculosis in New Zealand was 649, the death-rate from all forms per 10,000 of mean population being 4·55; the corresponding figures for 1935 being 576 and 3·88. Roughly, the population of New Zealand consists of 1,500,000 whites and 75,000 Maoris.

Of the 576 deaths above mentioned, 471 (3·17) were assigned to pulmonary tuberculosis and 105 (0·71) to other forms of the disease.

I understand that the corresponding figures for England and Wales for the year 1935 are death-rate per 10,000 of mean population for pulmonary tuberculosis 6·1, and for other forms of tuberculosis 1·1. The death-rate for tuberculosis is, therefore, somewhat less in New Zealand.

In 1935 the standardised death-rates per million of mean population for *males* for all forms of tuberculosis were 398, and for the respiratory system 312; the corresponding figures for *females* being 344 and 287.

The notified cases of pulmonary tuberculosis numbered 808 in 1935, and during that year, as already stated, 471 deaths occurred from this form of the disease, equalling 3·17 per 10,000 of the mean population.

It appears that in cases other than pulmonary tuberculosis in New Zealand, approximately 80 per cent. were due to the human type and 20 per cent. to the bovine type of the bacillus. The Director-General of Health states that proper pasteurisation of milk for human consumption eliminates the risk of this disease, but adds: "Such method of treatment of milk is only available in the larger centres of population."

With regard to treatment in New Zealand there are the domiciliary method, the tuberculosis clinics and the sanatoria. In certain of the larger hospitals special facilities exist for the treatment of the tuberculous patients. Travelling tuberculosis clinics have been established in various districts.

There is also in vogue in New Zealand a system whereby a tuberculosis specialist visits various centres in the Hospital Board district at regular intervals and, in co-operation with the medical superintendents and local

medical practitioners, examines and gives an opinion on any cases referred to him. It is hoped by this means to achieve the following objects:

(*a*) To follow up and keep under observation cases that have been *discharged* from sanatoria.

(*b*) To follow up and keep under observation the *contacts* of actual cases of tuberculosis.

(*c*) To arrive at an *earlier diagnosis in suspected cases*, so that sanatorium treatment may be instituted at the most favourable period.

The services given by the tuberculosis expert are entirely free, and the Boards administering the sanatoria pay all the travelling expenses. The institution of this travelling clinic has involved the various Hospital Boards in no additional expenditure. They will, however, have some extra expenditure with the increased number of cases suitable for sanatorium treatment that must inevitably be discovered.

In Auckland and also at Dunedin there have been established what are called Sunshine Schools, where in addition to most excellent housing, any undernourished children are specially fed and live under ideal conditions. I can personally testify to the excellence of these sunshine schools.

I would like to quote Dr. M. H. Watt, Director-General of Health, in his report for the year ending March 31, 1936, from which I have already quoted. Speaking on tuberculosis in New Zealand, he states: " The death-rate from tuberculosis (all forms) was the lowest ever recorded, being 3·88 per 10,000 (4·20 in 1934). A definite advance has been made in the campaign against this disease by the establishment of tuberculosis clinics in various parts of the North Island, similar to those operating for a number of years in the South Island." He goes on to state that in the future certain tuberculosis specialists will pay regular visits to various centres, and proceeds: " The co-operation of the medical superintendents of hospitals and the local practitioners is assured, and it is hoped that when the scheme is fully organised it will materially assist in the selection of cases suitable for a sanatorium at an early stage in the disease, and will also ensure that all contacts are kept under regular medical or nursing attention. In Auckland the Hospital Board has its own tuberculosis officer and administers a tuberculosis clinic in connection with the shelters at Costly Infirmary. Wellington Hospital Board's decision to appoint a whole-time tuberculosis officer and to organise the necessary clinic in the city area will also stimulate the campaign against the disease in that city.

A most excellent report has just been received from Dr. H. B. Turbott, Medical Officer of Health at Hamilton, New Zealand, dated April 12, 1937. He states that in 1933 he carried out a thorough survey of a typical Maori county population to determine the true position. Maori morbidity-rate

from tuberculosis, all forms, was 56·8 per 1,000. The mortality for all forms was severe, 49·4 per 10,000, as compared with 4·5 per 10,000 in Europeans. There was a widespread failure to seek aid, although the facilities (described above) were adequate and available. Of the tuberculous, only 26·9 per cent. obtained hospital treatment, 2·6 per cent. sanatorium treatment, 9·5 per cent. domiciliary treatment by medical practitioners, while 60·8 per cent. had no institutional or practitioner's treatment whatsoever. It became immediately obvious that the facilities as provided for the European tuberculous were in practice being neglected by the Maori.

This led to a search for underlying causes. General educational standards and attainments were inferior to European ones, and particularly health education. Perception of the real cause and means of spread of tuberculosis was lacking. Pulmonary tuberculosis was called " the wasting sickness," the argument commonly presented that it was sent as an affliction from heaven, and European attempts at prevention therefore useless. Alternatively, it was recognised as " running in families," and strongly regarded as hereditary in origin. The services of a medical practitioner or district nurse were not sought in a large number of cases. In the minority who had attained hospital treatment there was rarely the disposition to remain a sufficient time in the institution. The place was strange, the staff of another race speaking a language unintelligible to the older patients, and the urge was always to get away home, where their wants would be readily understood and where friends could come and go as they pleased.

In the field-work it was definitely proven that the bovine form was a negligible factor in the incidence of Maori tuberculosis. The infection was human. Ready spread was achieved through contact, rendered easy by overcrowding in defective houses, by faulty hygiene in the home, and by malnutrition.

The accurate knowledge gained from the survey enabled the planning of care and follow-up work suited to the peculiar needs of these people. Any proposed scheme should have educational value, be psychologically suited to the natives, should break the chain of contact infection, and help ameliorate faulty environmental conditions. Such a scheme should be limited to small proportions until proved successful, and be possible of extension rapidly to cover all Maoris when this end was achieved. A care and after-care scheme was begun at the end-conclusion of the survey, and in the same county, covering about 4,000 Maori population. After three years' trial, it has proved sufficiently successful to recommend for adoption for Maoris throughout New Zealand.

The Scheme in Operation.

A district nurse was detailed for the special work of a tuberculosis visitor, herself a Maori, and 115 cases came under her care. None of the cases were early in type. Follow-up work was undertaken along these lines:

1. Regular visitation of the cases.

(*a*) To oversee the domiciliary treatment of the case, always keeping in view the hope of a clinical cure. Rest in bed for long periods until the sputum was negative at repeated tests was aimed at. Periodic X-ray check of progress was arranged at the county hospital, whenever it was possible to transport the case.

(*b*) To teach the patient and other members of the household how infection was spread. Sputum flasks were provided. The proper use and care of these, and correct sputum disposal was taught. The patient was encouraged to reduce handling, kissing, or touching others, especially children, while the other household members were taught how to protect themselves—*e.g.*, to wash hands immediately after touching the patient or anything belonging to the sick person.

(*c*) To teach barrier nursing of the case and segregation within the home, either in a separate room, out on a porch or verandah, or, failing that, in a one-room home, at one end of the room, or, better still, in a tent outside. Separate bed and bedding, towels, clothes, separate dishes, personal hygiene requirements, etc., were taught.

(*d*) To demonstrate to the healthy natives in the county, by means of this constant visiting, exactly which homes were tuberculous, and as the knowledge of the germ-spread of tuberculosis gradually disseminated throughout the country, this led to less visiting of dangerous households. House-to-house visitation is a daily habit in natives living a communal form of life, and the Maori has a custom, called "hongi," of flattening nose against nose as a salutation.

2. Constant watchfulness was maintained for new cases.

Throughout the county the tuberculosis nurse formed a new interest for the natives, and the Maoris themselves sought her out with information of suspected cases, when chest troubles arose.

3. Regular check was kept on the health of all contacts, adult and children, in the tuberculous households.

(*a*) Physical examinations and special X-ray examinations were made as necessary at the base hospital.

(*b*) Annual X-ray pictures of the children contacts were made to detect any possible early active infection.

(*c*) In some cases of poverty, extra food or clothes were arranged for the contacts.

4. Where the teaching could not or would not be assimilated, some further form of segregation would be required. It was planned originally to have a farm colony or settlement for these cases.

Results and Future Plans.

The field follow-up work described above has now been in operation three complete years. The educational process was a slow one, but surprisingly successful as the Maori population came to understand the nature of tuberculosis, its cause, and its method of spread. The first year was one of uphill struggle, with failures, but enough teaching successes to justify decided optimism. The second year was one of rapid Maori comprehension, or consolidation, and universal acceptance. The third year has shown the scheme grafted into the normal life of the community. Tuberculous cases are being segregated within their own homes, with occasional use of the base hospital in particular cases for special reasons. It has been a surprising but happy feature, in the poor and overcrowded tuberculous homes, to find the teaching assimilated and carried out, with double sets of everything: one for the patient, looked after separately, and another communal set shared by all the contacts.

The mortality in the demonstration area during 1933 was 49·4 per 10,000 for all forms of tuberculosis. The rates for the following years have been:

1934	..	..	..	..	..	49·4	per	10,000	
1935	..	..	..	..	..	54·4	„	„	
1936	..	..	..	..	..	24·7	„	„	

The morbidity of tuberculosis in the demonstration area was for all forms in 1933, the year of the survey, 56·8 per 1,000. The morbidity-rate for all forms of tuberculosis at the close of 1936 was 32·1 per 1,000.

There has been an encouraging and welcome fall in the acute fatal tuberculosis in children, from direct contact.

The demonstration of tuberculous care among Maoris in this county appears to be successful in reducing the mortality and morbidity of the disease. This year (1937) it is planned to provide a separate tuberculosis shelter in those cases where there is very poor housing and where the teaching has not been assimilated as well as elsewhere. Should this work successfully, it is planned thereafter to widen the scope of this tuberculous care demonstration, from the county where it now operates, to cover and care for tuberculous Maoris throughout New Zealand. This particular form of tuberculous care seems psychologically suited to the Maori.

Finally, I think it will be agreed that New Zealand's efforts to treat the white population suffering from tuberculosis and to prevent infection of the healthy are becoming more and more effective, while at the same time the very difficult problems presented in treating the Maori population, as Dr. Turbott has shown, are at last being gradually and successfully overcome.

In treating tuberculosis, particularly pulmonary, the one word ever to be kept in front of the patient is "hope," as the psychological effect is stimulating and uplifting and tends to a feeling of well-being. This and the individuality of the physician are of paramount importance. The ability to earn one's own living gives the greatest encouragement, hence one's unbounded admiration for the system established at the Papworth Village Settlement.

TUBERCULOSIS IN NIGERIA

By J. CAUCHI,
M.D.(MALTA),
Colonial Medical Service, Nigeria.

I FEEL very conscious of the honour that has been conferred on me in being asked to represent the largest colony in British West Africa at such a distinguished gathering as this, and to participate at these meetings, where the mutual exchange of experiences and difficulties cannot but help advance the social services and the interests of the Empire as a whole.

Our knowledge of tuberculosis as it affects Nigeria is comparatively meagre, and I propose to confine myself to a very few facts and figures.

In his report for 1935, the Director of Medical Services, Nigeria, states that during that year a total of 259,196 cases of infectious diseases (the term "infectious" being here used in its broad sense to include endemic and epidemic disease) were treated in the Government Institutions of that colony. Of this total, 722 cases were tuberculous infections, 458 affecting the respiratory system, and 26 being recorded as "disseminated."

It should here be explained that Nigeria has an approximate population of 20 million over an area of just under 373,000 square miles. Outside the municipal area of the capital town of Lagos there are practically no qualified men in private practice, and, apart from the comparatively few medical missionary activities, the only medical facilities available for the bulk of this large population are the Government hospitals and the Government staff. If one excludes those members of the staff who occupy purely

administrative posts and such European officers as have to be away from the colony on furlough, the actual available strength of the establishment in the country, at any one time, amounts to less than one hundred medical officers. It must be obvious that only a small minority of those suffering from disease can ever come to the notice of the medical organisation.

It is, therefore, unavoidable that our knowledge of the incidence of tuberculosis in Nigeria should be limited. That tuberculosis causes a considerable proportion of deaths must be inferred from the returns of Government institutions, where, in 1935, tuberculous infections accounted for over 23 per cent. of the total of 836 fatal cases of infectious disease.

In Lagos, with a population of about 170,000, registration of births and deaths has been in force for over half a century, and during the last ten years a post-mortem examination has been held in all those cases where a medical attendant's certificate was not forthcoming and where the age of the deceased was over two and under seventy years, even when such post-mortem examinations have not been demanded for police purposes. Thus, a considerable number of cases of tuberculosis have been only diagnosed after death.

Based on the morbid anatomy observed at autopsy, most cases seen in Lagos can be broadly classified into two main groups. One type shows cavitation and surrounding fibrosis of the lungs; these cases are often described as " chronic pulmonary tuberculosis," but the term chronic does not here refer to the long duration characteristic of chronic phthisis amongst the white races. The progress of these cases observed in Lagos, however, is relatively less rapid than in the rapidly fatal cases of disseminated and generalised tuberculosis that form the second group. This second type shows multiple lesions of the various organs and tissues—spleen, liver, and kidney, pleura, pericardium, and the general glandular system—usually combined with miliary or broncho-pneumonic spread in the lungs.

Clinically, in both groups the disease follows a steadily progressive course with little or no evidence of reparative change or signs of retrogression.

Observations followed up in recent years by Young at Lagos, and not yet published, tend to suggest that the two groups of cases may be correlated to two respectively different strains or groups of strains of the tubercle bacillus—a theory which, if confirmed, should have a bearing on practical methods of control. The relative importance of seed and soil is to be considered in organising preventive control of infectious disease.

In my report to the Lagos Town Council for 1934 I have tabulated a concise analysis of the tuberculosis deaths certified over a period of eleven

years. Recorded as a percentage of the total deaths registered yearly in Lagos, tuberculosis accounted for:

2·6	per cent.	of	all deaths	in 1924
3·1	,,	,,	,,	1925
3·3	,,	,,	,,	1926
5·9	,,	,,	,,	1927
7·1	,,	,,	,,	1928
7·4	,,	,,	,,	1929
7·4	,,	,,	,,	1930
9·8	,,	,,	,,	1931
9·7	,,	,,	,,	1932
6·8	,,	,,	,,	1933
8·8	,,	,,	,,	1934

As far back as January, 1913, in a paper delivered to the Société de Pathologie Exotique (*Bulletin*, vol. vi., no. 1), Mouchet quoted just as alarming figures for the Belgian Congo; in reckoning these percentage figures for the Belgian Congo, deaths from sleeping sickness are excluded.

In Lagos, premises where cases of tuberculosis are known to have occurred are disinfected by the Health Department, explanatory leaflets are left at such places and the subject of tuberculous infection and its modes of spread and prevention are stressed in the course of health propaganda activities. When possible, cases are isolated in separate wards at the hospitals. Facilities, however, for specialised tuberculosis preventive work have not been available to date.

For the whole of Nigeria, tuberculosis has been made notifiable since last year, and cases are being reported from many of the hospitals.

Lagos has been undergoing very rapid urbanisation in recent years, and its population has, by immigration from the interior, increased at an astounding rate within a short time. New house-building has lagged behind this increase of population, and overcrowding has inevitably resulted. Under the circumstances, there can be little doubt that spread of infection is by inhalation, and that town planning and housing improvement, which are being energetically pursued, constitute sound lines of control. The same may not necessarily be the case in other parts of Nigeria; proof of infection from bovine to human being cannot be adduced, but a few remarks about cattle infection may prove of interest.

Meat inspection at slaughter-houses is steadily though slowly improving with the improvement in the quality and quantity of the sanitary staff. Through the co-operation of medical and veterinary officers, cases of tuberculosis in cattle are being discovered in widely scattered districts. The numbers reported are small, but their existence cannot be ignored.

It is recorded that in the Cameroons, a German colony before the war, cattle were found infected with tuberculosis as far back as 1916. Some years

later, an outbreak of tuberculosis was discovered in a herd and traced to a bull imported from Europe; to prevent spread the whole herd had to be destroyed.

In Lagos, the Medical Officer of Health reported twelve cases of suspected tuberculosis in cattle as the result of meat inspection during 1916; he reported fifty-four definite cases during 1917 and eighteen cases during 1918. No cases of bovine tuberculosis appear to have been recorded in Lagos again until 1931, when two cases were demonstrated at the Lagos abattoir; there were ten cases in 1932, three in 1933, and six in 1934. No meat cattle are kept in Lagos for any length of time as the animals are slaughtered within a few days of their arrival from the interior.

Natural bovine infection with tuberculosis was reported by Norman Hall in Nigeria in 1931; the case occurred in one of the stock farm oxen at the Government Veterinary Headquarters in Vom, which is situated about 500 miles inland from the coast and some 4,000 feet above sea-level. The disease was only diagnosed post-mortem; at that time about 700 cattle were being examined post-mortem every year.

Some time later, following a reaction to a tuberculin test, several more cases of tuberculosis were confirmed in bovines from the same stock farm; the cases were found to have come either from Southern Nigeria or from Adamawa Province, which borders on the Cameroons. In February, 1933, however, Beaton reported a case in a bovine stated to have come definitely from a well-known herd in Kano Emiratte, which is part of the large cattle-raising area of the extreme north of Nigeria; cattle are here ranched in the open all the year round. Beaton's case was discovered in the course of meat inspection at Kano, and the diagnosis was confirmed by inoculation into goats and subinoculation into guinea-pigs.

In Nigeria, fresh cow's milk is not a common article of diet except amongst the Fulani herdsmen—nomads living in the open air. There is, however, a considerable amount of sour milk and ghee sold and consumed in Northern Nigeria.

Meat inspection is at present only practicable in the larger towns, and then only by local staff, which is comparatively immature and not always altogether reliable. Hence, the information available is necessarily fragmentary, but what is known does suggest that tuberculosis is occurring amongst the local cattle though there has been a tendency to ignore its existence in the past.

Ample material is thus available for tuberculosis research by clinician, laboratory worker, and public health officer as soon as the country can afford to add to its present much-too-limited staff.

In fairness to those responsible for the allocation of the country's revenue, I must point out that tuberculosis is only one of many mass infections demanding control. Sleeping sickness, venereal diseases, yaws, bilharziasis, guinea-worm infections, malnutrition, leprosy are among the most widespread conditions constituting medical social problems of some magnitude. Moreover, medical preventive work cannot be divorced from other calls on the revenue of a young colony; there are, for instance, the needs of education in the broadest sense of the word, and the necessary expenditure on public works for the provision of potable water supplies, for improved town and house sanitation, and for the development of better communications.

Much faith, effort, and perseverance are, therefore, called for, and we should derive much benefit from a conference such as this, with its opportunities for personal contacts amongst public health and social workers coming from the various parts of the Empire; such meetings cannot but bring to us useful additional knowledge and help us on the way towards dealing with the problems that remain ahead.

TUBERCULOSIS IN NORTHERN RHODESIA

By G. M. G. POWELL,
M.D.,
Representing the Medical Services, Northern Rhodesia.

I HAVE listened with great interest to all those who have spoken as regards Africa—South Africa, Tanganyika Territory, and Nigeria. You can see Northern Rhodesia keeping coyly up here on the map. It is frequently mistaken for Southern Rhodesia, which is rather a big mistake, Southern Rhodesia having self-government and Northern Rhodesia being a Crown Colony. It is a country as big as France, and has a native population of 1½ millions, and a European population which is floating and which oscillates between 7,000 and 15,000. The question of tuberculosis as regards Europeans just simply does not arise. There is to all intents and purposes none. As regards the natives, we have in the whole territory thirty medically qualified people, which for a territory of that size is obviously inadequate, so we have, as practically everybody who has spoken about the African territories has said, no statistics, which is very pleasant in some ways but very unpleasant in others. We have no figures on which we

can work: we can only surmise. The question of after-care in tuberculosis, so far as I have seen it—which has been for a period of seventeen years—simply does not arise, because the cases are acute, and death takes place so rapidly that after-care does not enter the question.

The usual plea for money can be put forward, but I do not think really with any justification at the present moment. Northern Rhodesia itself is a young territory and decidedly backward as regards preventive medicine in every form. Certainly I agreed with Dr. Cauchi when he said that we cannot single out any one disease such as tuberculosis from the general mass of tropical diseases to which the natives of Northern Rhodesia and Africans as a whole are heir.

At the present time we are not in a position to conduct a tuberculosis survey, or even for that matter a nutritional survey; but I think we can look upon ourselves in Northern Rhodesia as definitely virgin soil now, and with all the information that has been supplied at this conference I look forward to the future with a considerable amount of hope. We shall have something very definite to go on. I do not feel at all happy as regards the annual report figures that come out, because we have got out of the approximately thirty medical people in the country twelve on the railway line, which runs from Cape Town through Northern Rhodesia up to the Belgian Congo. That follows the watershed, and it is practically in the centre of the country. Europeans gather there along the railway line, as is only natural; natives come in for work to where the Europeans are living; and up in the northern portion near the Congo we have now, I think, rather famous copper mines. This has brought about the concentration of a considerable number of natives looking for work; so much so that all who came applying for work could not get it. Then when the mines had found themselves with all they could possibly handle, they were left in that particular portion of the territory with a considerable number of natives with nowhere to go, and who could not possibly be given work. There were only a limited number of Europeans who could give them any work, so now the Government has decided to establish African townships in that area. With the establishment of those African townships, of which at least two are going up just outside the mining areas, I think we shall be in a position to investigate the incidence of tuberculosis, at least in the northern portion of Northern Rhodesia, even if we cannot do it in the villages themselves. The distances are very great and communication up there is not comparable with that in Southern Rhodesia or in the Union of South Africa.

I must say that I associate myself completely with Dr. Cauchi's remarks. He might have been speaking of Northern Rhodesia except that in Nigeria

they have gone a good deal farther than we have, and our means of getting any information as regards the incidence of tuberculosis in the native has been practically on a line with what he has already told you.

I do not think there is much more that I can say, but I have been deeply interested in the whole conference. I have learned a lot and I hope I shall be able to put the knowledge that I have acquired to some practical use in the near future.

REVIEWS OF NEW BOOKS

Bernard Bang. Selected Works. Edited by VALD ADSERSEN, Professor at the Royal Veterinary and Agricultural College, Copenhagen. Levin and Munksgaard, Copenhagen, and Oxford University Press, 1936. Pp. 560. Price 30s.

Professor Bang's literary production was very comprehensive, and those of his works selected for his book are divided into three groups: First, those concerning his investigations into certain important diseases in animals; secondly, those on tuberculosis of the udder and on tuberculous milk; thirdly, those dealing with the use of tuberculin and methods of eradicating tuberculosis from cattle.

The paper entitled "Studies on Tuberculosis in Domestic Animals and what we may learn from them regarding Human Tuberculosis" is of special interest. It can be proved beyond doubt that tuberculosis acts just like any other contagious disease in cattle; in other words, the disease appears only when the contagion is imported.

In 1892 he devised a method of turning a tuberculous herd of cattle into a healthy one. Badly infected animals are killed, as any sensible cattle owner would do in any case, but those which react to tuberculin without being clinically unhealthy are kept in separate stables from the non-reactors. Calves born to the reactors are removed from the infected stable and protected from the danger of infected milk by giving them either boiled milk or that from healthy cows. Thus a healthy herd can eventually be obtained without extensive slaughtering. He found by tuberculin tests that the calf of a tuberculous cow was practically never infected at birth.

Bang did not deny the importance of susceptibility, for, he said, the cultivation of tubercle bacilli in the body of man or animal is just the same as in the culture of any plant. It is not enough to sow the seed; there must also be a soil in which it can thrive. The important factor, however, he regarded as freedom from exposure, and thus only can tuberculosis be rooted out of a herd. The same view may be applied to the eradication of tuberculosis from human beings, and is supported by the success of the Grancher system.

The volume contains a well-chosen selection of the works of a great man, and will make a valuable addition to the library of anyone interested in these subjects.

L'Infection Bacillaire et la Tuberculose, chez l'Homme et chez les Animaux. By A. CALMETTE. Fourth Edition, edited by A. Boquet and L. Nègre. Paris: Masson et Cie, 1936. Pp. 1025. Price 150 francs.

This edition, published nine years after the preceding one, has been produced by MM. Boquet and Nègre, who have kept to the original plan of Calmette, except in certain details.

The first part deals with the method of infection by the tubercle bacillus, and this is discussed in full details.

The second part is devoted to tuberculosis in animals and experimental tuberculosis. This is of great interest, because the value of comparing lesions in the human being with those found in animals has not been appreciated, and the authors show how much can be learned from such a study.

The third part is concerned with the defensive factors against tuberculosis, and here the effects of B.C.G. are described.

Details of infectivity, allergy, and hypersensitivity are given, and the expert will find much useful information in this volume, which really is a treatise for the specialist rather than for those with no special knowledge of the many problems presented by tuberculosis.

It is well produced and illustrated, and can be warmly recommended.

Sick Children. By DONALD PATERSON, M.D. (Edin.), F.R.C.P. (Lond.); Physician to the Hospital for Sick Children, Great Ormond Street; Physician for Diseases of Children, Westminster Hospital. London: Cassell and Co., 1937. Second Edition. Pp. 600. Price 12s. 6d.

The author has brought up to date the diagnosis and treatment of children's diseases in this edition. It is intended for medical practitioners, and perhaps more especially for senior students, for whose benefit recent examination papers on children's ailments have been added in an Appendix.

Much of the modern work concerns anæmia, but our readers will find most interest in the pages devoted to tuberculosis. The statements that the human form of tuberculosis is much more fatal than the bovine form, and that, apart from the miliary type, pulmonary tuberculosis is rare in childhood are perhaps open to criticism, and differ fundamentally from the teaching of Armand Delille and others.

The account of tuberculosis of the various organs is, however, excellent, that dealing with abdominal tuberculosis being especially good.

An interesting account of bronchiectasis is included and treatment by posture is described. The author has experienced success in these cases from lobectomy, which he regards as the treatment of the future.

The first edition of this valuable book is well known to students, and the new edition will receive a deserved welcome.